THE BUTTERFLIES OF NEBRASKA

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INTRODUCTION

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Relatively few books or even lists of the butterflies of specific states are presently in existence. Of those which concern the Great Plains states, Field's (1938) study of Kansas butterflies is perhaps the best known and most complete. Leussler's (1938-39) brief annotated list of Nebraska butterflies and Truman's (1896) list of South Dakota Rhopalocera are less familiar to lepidopterists. Because of the increased usefulness of such studies to students of distribution and taxonomy, I initiated an eventual ten-year study of the distribution and taxonomy of the butterflies of Nebraska.

It is my purpose to provide a comprehensive account of the occurrence and some aspects of the biology of the butterflies of Nebraska. The depth of detail should make it beneficial to both amateur and professional lepidopterists, as well as other entomologists interested in butterflies.

REVIEW OF LITERATURE

Most of the research on Nebraska butterflies can be attributed to a few collectors. The earliest studies were in the late 1800's by staff of the University of Nebraska. At the turn of the century several expeditions were sent by the University throughout the state to collect many types of biological specimens. The published information on butterflies is summarized below.

W. L. Carpenter (1880) published a list of a few species of butterflies taken at Fort Niobrara, in Cherry County. H. G. Barber (1894) followed with a short and briefly annotated list of the butterfly specimens in the University collection. Most of these specimens are still in the State Museum at the University. Merritt Cary (1901), who had accompanied two University expeditions to the Pine Ridge in western Nebraska, published a list of butterflies found in Sioux County canyons. Cary (*loc. cit.*) listed nearly one hundred species, with brief annotations.

The main contributor in the early history of Nebraska lepidopterology was R. A. Leussler. He collected throughout the state during and after the initial University expeditions. His earliest paper (1913) treated the butterflies of the Omaha area in Douglas County. His more extensive annotated list of Nebraska butterflies appeared in 1938 and 1939 and is still most helpful to collectors. Leussler included nearly all known Nebraska species, listing 159, but many of these taxa are now considered subspecies. Consequently, there is difficulty in using his work since the nomenclature for many of the species has been changed. Furthermore, his papers were brief and lacked the full account of geographical and temporal distribution of species.

Throughout the early 1900's another little known collector, E. A. Froemel, of Columbus, Nebraska, collected avidly in Platte County. His collection remains in Columbus. None of his work has been published, but his records are incorporated into the present study. In recent times, there have been two other important Nebraska lepidopterists: O. D. Spencer and Steven J. Kohler, both of Lincoln. Their records from their personal collections are also included herein.

Most of the collecting on which this study is based was done during the past ten years (Fig. 2). I began collecting in the Pine Ridge area in 1960 and have since worked in nearly every Nebraska county. In 1967, Dr. Elray S. Nixon (a botanist) and I published a detailed paper (Johnson and Nixon, 1967) on the Rhopalocera of the Pine Ridge.

The culmination of my own research accounts for about two-thirds of the data in this study. The other portion was based on published literature and the unpublished records of many collectors.

METHODS AND PROCEDURES

Standard methods of butterfly collecting, as treated in any popular account of lepidopterology, were used. Only adults were taken, and traps were not used. Rotten fruit was used as bait for females of the genus *Asterocampa* for acquisition of ova on several occasions. Sight records were included only on rare instances, when they constituted the only recent record for a species, and are noted as such. My personal collection of Nebraska butterflies will be deposited in the collection of the University of Northern Iowa. A compiled record of all data on Nebraska butterflies will be left at that institution.

Distribution maps were kept for all species, as were data on the specific locality, date, and collector. During several summers, calendars of adult flight periods were kept for each species to determine voltinism and temporal distribution.

Extensive collections were made throughout the state after 1960 by the Nebraska lepidopterists. Fig. 2 shows the relative amount of this recent sampling in various Nebraska counties. Counties with no sampling since 1960 are left blank. Areas of extensive sampling in the west represent my work and those in the east the work of Mr. Froemel (Platte County), Mr. Spencer and Mr. Kohler (Lancaster County), and the staff of Kearney State College (Buffalo County). I have been able to do frequent sampling in several other western counties; these are indicated with the medium dot.

The collection at the University of Nebraska State Museum was canvassed for records, and historical records were obtained from the Leussler Collection at Ohio State University, Columbus, Ohio.

Collaborators were solicited and their records, primarily based on their determinations, were inserted into the data. In most instances specific identification is sufficiently easy that this method is deemed reliable. In cases where taxonomic assignment is known to present difficulty, I either examined the specimens personally or referred them to specialists.

Available literature was examined and data recorded, and the taxonomic status was updated where appropriate.

The data are presented in an annotated list, which includes geographic and temporal distribution as well as pertinent discussion, and also by distribution maps. The latter are included for forty-eight species. The order of nomenclature follows dos Passos (1964).

ACKNOWLEDGMENTS

A project of this scope cannot be completed without the help of collaborators. I am indebted to Mr. F. Martin Brown, of Colorado Springs, Colorado, for his encouragement and helpful comments throughout the study. In more recent years I have benefited greatly from the help and advice of Dr. John C. Downey, under whose supervision the final manuscript was written as part of my Master's degree work at the University of Northern Iowa. The advice of the other members of my graduate committee, Dr. Virgil Dowell, Dr. Lawrence Eilers, and Dr. Daniel Cahill was also helpful.

I am also extremely grateful for the continued help of Nebraska lepidopterists, Mr. O. D. Spencer, Mr. E. A. Froemel, and Mr. Steven J. Kohler. Mr. Leonard Running spent over six weexks of the summer of 1969 with me in the field and contributed many specimens. Mr. Michael Christenson, a fellow graduate student at the University of Northern Iowa, aided in laboratory work. William Witt did the photography for the publication.

Several others contributed records for this study. These individuals were: Beth Bennett, John Blinde, Nelson Foster, Richard Hardesty, Stanley Longfellow, Elray S. Nixon, Carol Orr, Clifford Quick, Robert Taylor, Mrs. Robert Woodley, and Katherin Zochol.

I am grateful also to the museum curators at the following colleges and universities for records from their collections: The University of Nebraska, The Ohio State University, Southern Illinois University, Chadron State College, Kearney State College, and The University of Northern Iowa.

Thanks are also due to numerous specialists throughout the country who have aided with determinations. When appropriate, these taxonomists are credited in the annotated list.

ANNOTATED LIST

SATYRIDAE

Subfamily Satyrinae

Oeneis uhleri uhleri **(Reakirt) — The Uhler's Arctic**

The genus *Oeneis* is a montane taxon occurring in both the eastern and western mountain areas of the United States. *O. uhleri* is recorded from Sioux County in the extreme western part of the Pine Ridge, where it occurs on the canyon grasslands. It may also enter Dawes County. There is one annual brood, flying from mid- to late May. The species is sometimes very common. The population in the Pine Ridge is close to typical *uhleri,* but specimens are larger and more tawny colored. Markings are concise, particularly the mesial band, and most specimens compare closely with the figure in Holland (1949).

Cercyonis oetus oetus **(Boisduval) — The Dark Wood Nymph**

The Dark Wood Nymph, a species found throughout the sage-covered plains of the western United States, enters Nebraska in the Pine Ridge. Cary (1901) reported it as common in the sagebrush areas of the Ridge in July. The only recent record is a specimen which I took near Crawford, Dawes County, on 6 July 1962, in a grassy area north of the escarpments.

Cercyonis meadii **(Edwards) — The Mead's Wood Nymph**

C. meadii is a montane satyr occurring in the woodlands of the Rocky Mountain states. There are only a few records in Nebraska. Old specimens from Monroe Canyon, Sioux County, are in the University of Nebraska Collection. They lack full data but the labels indicate that they were probably taken in August, 1921. The only recent series were from the same locale and collected by Nelson Foster. These specimens, which I had originally verified, have since disappeared. Cary (1901) mentions a sight record in Monroe Canyon. The species should be sought in the grassy areas amid the pine stands in northwestern Nebraska.

Cercyonis pegala **(Fabricius) — The Wood Nymph**

This common species is a highly variable entity and infraspecific segregates are still disputed throughout North America. Several races are presently accepted by taxonomists, even though forms resembling these races occur within so-called "stable populations". Hence the reported occurrence of four "subspecies" in Nebraska.

When series of specimens from throughout the state are examined most are best associated with the name *C. p. olympus* Edwards. In the eastern part of the state *p. olympus* shows slight tinges of the orange-yellow forewing patch, which is supposedly typical of the taxon *p. alope* in eastern and southern areas of the United States. Hence, the latter name has been used by some collectors for Nebraska material.

Another subspecies occurs in the state with quite typical individuals. Steven J. Kohler, of Lincoln, Nebraska, has three specimens in his collection from Holdrege, Phelps County, 25 July 1968 which are *p. texana* Edwards. The yellowish-orange patch is extensive and the underside is light with large eyespots on the hindwing. These specimens were taken flying with *p. olympus*. No doubt, more of these individuals occur in southern Nebraska.

A fourth "subspecies," *p. nephele*, has been reported in the early literature (Barber, 1894; Cary, 1901). These specimens are no doubt *p. olympus* and the use of the name *nephele* is probably a result of these eastern collectors' familiarity with the subspecies in the northern Mississippi Valley, and a lack of experience with more western *p. olympus*. The latter was named only a few years before these writers' publications appeared.

There is one annual brood of this species in Nebraska. It flies throughout July and, with fewer numbers, into August and early September. Females emerge about a week or two weeks after the males.

***Neominois ridingsii ridingsii* (Edwards) — The Ridings' Satyr**

N. r. ridingsii is a western species characteristic of dry grasslands in the Rocky Mountain states. It has been taken in two areas of western Nebraska exhibiting grassy plains at near 5000 ft. altitude. These are Sioux County in the Pine Ridge, and Kimball County in the southwest "panhandle." All of the records are old and are dated from mid-May to late June, indicating one annual brood. The largest series of specimens, from Harrison, Sioux County, is in the University of Nebraska Collection. The Kimball County specimens were taken 24 June 1933 and are in the Leussler Collection at the Ohio State University, Columbus, Ohio. The species should be sought in the canyon meadows of the western escarpments, but disappearance of undisturbed prairie has no doubt limited its distribution in the state.

***Coenonympha ochracea ochracea* Edwards — The Ochre Ringlet**

The genus *Coenonympha* is a northern and montane taxon occuring throughout the Holarctic Region. The species *C. o. ochracea,* has been recorded in recent years only from Dawes and Sioux County in the Pine Ridge. Leussler (1938) recorded it also from Cherry County, the area of the Niobrara River escarpments, but I have not found it there. It seems possible that the species occurs in the Wildcat Range, but it is as yet unrecorded from there. Suitable bioxes exist in all of the above areas. There is an old record, very doubtful, from Lincoln, in Lancaster County, in the University of Nebraska Collection. It is undated. In the Pine Ridge, the Ochre Ringlet has one annual brood which flies from early to late June. Specimens from the Pine Ridge compare favorably with *o. ochracea* as discussed in Johnson and Nixon (1967). Merritt Cary (1901) also used this name. Leussler chose to refer his Cherry County specimens to the species *inornata*. I have not seen these specimens.

Euptychia cymela (Cramer) — The Little Wood Satyr

The Little Wood Satyr is a common butterfly but has not been recorded west of Nebraska. The species has been taken in twenty-six Nebraska counties as illustrated in Fig. 3. Brown *et al.* (1957) does not mention the species from Colorado, but I have found it common in Keith County, Nebraska, near Kingsley Dam, close to the Colorado border. There is no major topographic or vegetative region of the state where it is not recorded. There are two broods—the first from late May through June and the second from mid- to late July. I discussed the distinction of Nebraska specimens from their eastern counterparts in my 1967 paper. Nebraska specimens generally exhibit the darker underside, a trait most notable in the western Nebraska specimens.

Subfamily Lethinae:

Lethe eurydice (Johannson) spp. — The Eyed Brown

In 1916 (dos Passos, 1964) Leussler described the subspecies *fumosus* from specimens taken in Douglas County in eastern Nebraska. Since then this entity has been considered extinct. Steven J. Kohler, of Lincoln, Nebraska, has been searching for populations near the type locality in recent years in hope of "rediscovering" individuals which fit the original description.

Recent records of *L. eurydice* from Nebraska are from six counties in the northwest as illustrated in Fig. 4. There is a single annual brood, flying throughout July. The trinomial designation of these specimens is yet unknown, since there is no named subspecies west of Leussler's *fumosus*. Both Mr. Kohler and I feel that it is too early, and that there too few specimens to make a decision on their subspecific status. West Nebraska specimens are not typical *fumosus*, however, fresh specimens being somewhat smaller and darker than fresh eastern material. If Mr. Kohler can rediscover the typical *fumosus* in the eastern part of the state, it will be interesting to compare these with the scattering of specimens from the west.

Lethe portlandia (Fabricius) — The Pearly Eye

Although the Pearly Eye is known in Nebraska from only six eastern counties (Fig. 5), its known distribution extends from the Kansas border north to Columbus, and from the Missouri River west to Hastings. Mr. Froemel has taken it frequently at Columbus. Nebraska collecting dates range from a spring brood in early June to mid-July, to an apparent late summer brood in early August. These areas were originally tall-grass prairie but now are under extensive cultivation.

DANAIDAE

Subfamily Danainae

***Danaus (Tasitia) gilippus* (Cramer) — The Queen**

D. gilippus is a southern representative of the genus *Danaus*. Most records for the Queen in Nebraska are from the eastern part of the state, where it may be a summer resident (Fig. 6). None of the records for the species is recent. E. A. Froemel reports two females, one from 1934 and the other from 14 July 1937. The only other records are in the University of Nebraska Collection: Mitchell, Scotts Bluff County—female, 20 August 1916; McCook, Red Willow County—female, 20 July 1913; Lincoln, Lancaster County—male, 17 July 1921. There is also a specimen, reputedly from Hastings, Adams County, in the Hastings Museum.

***Danaus (Danaus) plexippus plexippus* (Linnaeus) — The Monarch**

D. plexippus is a common species ranging throughout many parts of the world. It flies throughout the state of Nebraska, being reported from nearly forty of the ninety-three counties. Each year are several overlapping broods from May to October. To my knowledge there have been no recorded massive migrations of the species in Nebraska. The foodplant is milkweed (*Asclepias sp.*).

NYMPHALIDAE

Subfamily Heliconiinae

***Agraulis vanillae* (Linnaeus) — The Gulf Fritillary**

This southern species has been captured a few times in eastern Nebraska. It is not a resident but strays north from its usual southeastern distribution. In the east, Klots (1951) mentions it as far north as New Jersey. E. A. Froemel has three males from 11 June 1939, taken in Columbus, Platte County. O. D. Spencer has a specimen from Lincoln, Lancaster County, 25 October 1963, and there are other Lincoln specimens in the University of Nebraska Collection from the 1920's. I have a sight record from Table Rock, Pawnee County, 18 June 1969.

***Dryas julia* (Fabricius) — Julia**

Leussler (1938) reported a specimen taken by Mrs. W. B. Graham at Omaha, Douglas County, September 1908. Since neither the foodplant, Passion Flower (*Passiflora*), nor favorable climate for the species occur in Nebraska, he postulated that this insect was introduced as an egg or larvae on some tropical plant. The species is a resident in the United States only in Florida and the Gulf States.

***Heliconius charitonius* Linnaeus — The Zebra**

The Zebra, another casual visitor to some northern states, is recorded only once in Nebraska, by E. A. Froemel in Columbus, Platte County, in 1939. The species is a resident of Florida and the extreme southeastern United States and has strayed into Kansas and Colorado (Field, 1938; Brown *et al.*, 1957).

Subfamily Argynninae

***Euptoieta claudia* (Cramer) — The Variegated Fritillary**

E. claudia is a tropical species which has established itself on several Nearctic plants like violets and pansies (*Viola* sp.). It occurs throughout Nebraska annually in several overlapping broods from late May to September.

***Speyeria (Speyeria) aphrodite* (Fabricius) complex — The Aphrodite Fritillary**

Several subspecies of *S. aphrodite* have been recorded from various parts of the state. The species distribution in Nebraska is shown in Fig. 7. It has one extended brood which flies from June into September. In the west (Pine Ridge and Wildcat Range) *S. aphrodite* specimens are best referred to the western subspecies *ethne* Hemming. They vary little from individuals of that taxon in eastern Wyoming. In eastern Nebraska there are few recent records but old specimens have been consistently called subspecies *a. alcestis*. This is probably correct. Brown *et al.* (1957) mentions *alcestis*-like individuals as far west as east-central Colorado.

***Speyeria (S.) cybele cybele* (Fabricius) — The Great Spangled Fritillary**

Though *S. cybele* has been taken in only twenty counties (Fig. 8), it no doubt ranges across the entire state. It is more common in the east than in the west. The species flies as early as the first week of June and extends into mid-August. In the west it is most common in mid- and late July. Although fresh individuals occur throughout the period, the species exhibits the extended single brooding of all the speyerids. All specimens which I have seen from Nebraska represent the typical subspecies *c. cybele* Fabricius. There are, however, individuals in the west that are less fulvous on the upperside, with a deep chocolate brown disc on the underside of the hindwings. These approach some aspects of ssp. *charlottii* Barnes, though there is no reduction of the silver spots.

***Speyeria (S.) atlantis* (Edwards) — The Atlantis Fritillary**

S. atlantis is a western montane species with its most common occurrence near Nebraska in the Black Hills of South Dakota. There are no recent specimens of the taxon from Nebraska, but old records and series do exist, all from mid-July, 1901, in Sioux County. Records are included in all of the old papers up through Leussler (1939), and have been called subspecies *laurana* dos Passos and Grey, *electa* Edwards, and *hesperis* Edwards. Grey, Moeck, and Evans (1963) pointed out the confusion in the taxonomy of the species in western South Dakota. Even if recent specimens from Nebraska were available, a specialist's opinion would be necessary.

***Speyeria (S.) callippe meadii* (Edwards) — The Callippe Fritillary**

This montane insect was recorded from the Pine Ridge by the early University of Nebraska expeditions (Barber, 1894; Cary, 1901),

and some of the specimens are still in the University Collection. These were taken from late June to mid-July. No recent specimens were known until I captured it in the Wright Gap, south of Melbeta, in the Wildcat Range, 28 June 1969. I have no doubt that it occurs in both the Pine Ridge and Wildcat Range.

***Speyeria (S.) zerene* (Boisduval) — The Zerene Fritillary**

There are two specimens from my large series of the *coronis–zerene* complex which are *S. zerene*. L. Paul Grey, of Lincoln, Maine, has seen one of these specimens and is of the same opinion, the second specimen is similar. I discussed the maculation of west Nebraska *zerene* and *coronis* in my 1967 paper (loc. cit.). The two zerene specimens, one from Sowbelly Canyon, Sioux County, 25 July 1964, and the other from the Wright Gap, Wildcat Range, 28 June 1969, are smaller than the usual *coronis*. They are lighter on the upperside and, most diagnostically, exhibit a disc on the underside of the hindwing which is nearly devoid of any brown and much the color of the light submarginal band. These specimens approach ssp. *garetti* Gunder. There are old series of *zerene* collected from mid-July from the same areas in the Pine Ridge in the University of Nebraska collection.

***Speyeria (S.) coronis* (Behr) — The Coronis Fritillary**

S. coronis is a common fritillary in the Pine Ridge and Wildcat Range from late June through July. Among its numbers fly a few *zerene* Boisduval. The maculation is close to that of ssp. *halcyone* Edwards which occurs in eastern Wyoming, but with less brown and more grey-green on the basal disc and similarly along the edging of the marginal silver spots.

***Speyeria (S.) edwardsii* (Reakirt) — The Edwards' Fritillary**

This western fritillary is restricted in Nebraska distribution to the escarpments of the western counties (Fig. 9). The single brood usually appears about the last week of June, and fresh specimens are on the wing throughout July and occasionally into early September. Sometimes the butterfly is found well out onto the plains; one specimen is reported from 25 June 1962 from Alliance, Box Butte County, at least forty miles south of the Pine Ridge.

***Speyeria (S.) idalia* (Drury) — The Regal Fritillary**

S. idalia is an eastern fritillary which apparently ranges over the entire state of Nebraska (Fig. 10), being recorded from eleven widespread counties. It is more common in the east but there are several records from the Pine Ridge. Though there is only one brood, it ranges from early June to mid-September.

***Boloria (Clossiana) selene* (Schiffermuller) — The Silver-Bordered Fritillary**

Mr. Steven J. Kohler is working to clarify the infraspecific taxonomy of Nebraska *selene* through extensive collecting and rearing.

In 1928 (dos Passos, 1964), Holland named the subspecies *nebraskensis* from Dodge County specimens. Just how this taxon relates to other Nebraska material is in doubt. There are other recent records of *nebraskensis* in the eastern counties (Platte, Saunders, and Cass). However, the species has also been found in two western counties (Sheridan and Cherry) (Fig. 11). Mr. Kohler captured fifty-two specimens at Smith Lake, Sheridan County, 1 August 1968, and I have two sight records from Valentine, Cherry County, 24 May 1969. Mr. Kohler's specimens do not appear to be typical *nebraskensis,* being quite small, nor are they *myrina* Cramer, a subspecies of general eastern distribution in the United States. It is still uncertain whether the species has a more widespread Nebraska distribution. E. A. Froemel has taken *selene* in Platte County, just west of Dodge County, and prefers to use the subspecies *myrina.* This would indicate that as the insect ranges west it varied from Holland's taxon. Hopefully, Mr. Kohler will find through rearing whether Nebraska specimens represent more than one valid taxon or how environmental condition may alter some wing characters.

Subfamily Melitaeinae

***Euphydryas anicia bernadetta* Leussler — The Leussler's Checkerspot**

E. anicia is a common butterfly throughout the northern Rocky Mountains. Leussler (1920) named this subspecies from specimens captured in Sioux County. Though it is unrecorded elsewhere, it is common in spring in that county flying in a single brood from mid-May to early June in the canyon grasslands.

***Melitaea (Microtia) pola* Boisduval — The Pola Checkerspot**

This is a common species in the western United States. There are five specimens of *M. pola* from Sioux and Dawes County in the University of Nebraska Collection. They were collected in late June and early July. Only one is labeled as to year: 1921. No recent specimens are known, nor do I know of other Nebraska specimens of this entity. The foodplant is yet unknown but there is little reason why such a common montane butterfly should not occur in the Pine Ridge.

***Melitaea (M.) ismeria carlota* (Reakirt) — The Huebner's Cresent-spot**

This species apparently ranges over the entire state of Nebraska. It has been captured in twenty-eight widespread counties. It flies annually from mid-May to September, indicating several broods. The foodplant is *Helianthus* sp., which is common in distribution throughout the state.

***Melitaea (M.) nycteis drusius* (Edwards) — The Silvery Cresent-spot**

Due to the general and widespread distribution of this species in the eastern United States, I have no doubt that it ranges over most of Nebraska. However, it has been recorded from only twelve

counties, and none of these is in the southwest (Fig. 12). It could be overlooked as *M. i. carlota* in the field. In the areas where it has been taken it is abundant. There seem to be two broods, ranging from early June to early July and then another appearance in mid-August. The latter brood is the smallest in number, only a few records being known.

Phyciodes (Phyciodes) vesta **(Edwards) — The Vesta Cresent-spot**

This is a plains species known to be a resident of Colorado (Brown, *et al.*, 1957) and Kansas (Klots, 1951). Leussler (1938) reported a single specimen from Omaha, Douglas County, 14 July 1912. The species is a rarity in the northern United States.

Phyciodes (P.) picta **Edwards — The Painted Cresent-spot**

A species characteristic of the southwestern United States, *P. picta* is known in Nebraska from two specimens. L. M. Gates took one female at Mitchell, Scotts Bluff County, 30 June 1913. It is in the University of Nebraska Collection. Leussler (1938) reported a specimen from Wauneta, Chase County, 21 June 1933.

Phyciodes (P.) campestris camillus **Edwards—The Camillus Crescent-spot**

Due to its general western distribution in the United States, I had expected the occurrence of this species in the Pine Ridge, but no specimens were known until Richard Hardesty captured it in Smiley Canyon, Sioux County, 8 June 1967. These remain the only known Nebraska records of *camillus.*

Phyciodes (P.) mylitta **(Edwards) — The Mylitta Crescent-spot**

P. mylitta is a western *Phyciodes.* I described the maculation of specimens of this species from the Pine Ridge in my 1967 paper (loc. cit.). They are not subspecies *mata* Reakirt (= barnesi Skinner) and much more typical of the nominate *mylitta,* especially on the underside. The upperside of Pine Ridge material has an almost striped appearance. There are only a few specimens, taken the second week in June, 1961, near Chadron, Dawes County.

Phyciodes (P.) phaon **(Edwards) — The Phaon Crescent-spot**

P. phaon is a species characteristic of the southeastern United States. Mr. Froemel has taken it in Columbus, Platte County, on 11 May 1938—female, and on 8 June 1939—male. I have another from Monroe Canyon, Sioux County, 14 July 1965. This specimen from the Pine Ridge represents a northerly extreme for the species in the United States. *P. phaon* has been taken once in Colorado (Brown *et al.*, 1957).

Phyciodes (P.) batesii **(Reakirt) — The Bates' Crescent-spot**

P. batesii is a species which occurs commonly in the northeastern United States and Canada. I have captured it often in the Pine Ridge, the only locality known for it in the state, seemingly a western

extreme for its North American occurrence. About a dozen specimens have been collected by Dr. Nixon and me, and range in time from late June to mid-July in the Ridge canyons. The insect is single-brooded in the northeastern United States (Klots, 1951). Its foodplant is asters (*Aster* sp.).

***Phyciodes (P.) tharos tharos* (Drury) — The Pearly Crescent-spot**

P. tharos is a common butterfly throughout the state, reported from twenty-five widespread counties. There are a least two broods, one from May to mid-June and a second from late June or early July flying into late August. The foodplant is *Aster* sp.

***Phyciodes (Tritanasea) texanna* (Edwards)—The Texas Crescent-spot**

P. texanna is a species characteristic of the gulf states, straying north into Kansas (Field, 1938) and Nebraska. Mr. Froemel, in Columbus, Platte County, has collected it as recently as 1952. His two records are from Columbus, 20 July 1935—male; and 19 October 1952—female. The latter is apparently from a fall brood. There is also an old record from Stapleton, Logan County, 24 June 1938. Leussler (1938) reports several specimens from Omaha, Douglas County, all from the fall.

***Chlosyne lacinia adjutrix* Scudder — Scudder's Patched Butterfly**

This is a casual species in Nebraska native of Mexico and southern Texas. Steven J. Kohler has taken two specimens in eastern Nebraska counties. They are from Lincoln, Lancaster County, 8 August 1968 —male, and Ashland, Saunders County, 11 August 1968—female. These are the only recent records. Leussler (1938) reports one specimen from Omaha, Douglas County, 15 October 1920.

Subfamily Nymphalinae

***Polygonia progne* (Cramer) — The Gray Comma**

P. progne is an eastern species finding its western limits in Nebraska and Kansas. Although records of *P. progne* are found throughout the old literature on Nebraska Rhopalocera, its present distribution is still confusing. There are old specimens in the University of Nebraska Collection from Monroe and Warbonnet Canyons, Sioux County, from early June to early September. I have not found it in this area in recent years. However, I have a number of specimens which were taken along with *P. comma* in Beatrice City Park, Gage County, 18 June 1969, which prove its occurrence in eastern Nebraska.

***Polygonia zephyrus* (Edwards) — The Zephyrus Angle-wing**

P. zephyrus, a species characteristic of the western United States, is not uncommon at certain times in the Pine Ridge. It has been taken there by me in Dawes and Sioux Counties. Steven J. Kohler also has a specimen from Valentine, Cherry County, 16 July 1968. In the Pine Ridge, it is taken most commonly throughout July, but I have a spring record from 30 May 1964, indicating there may be two broods.

Polygonia hylas **(Edwards) — The Colorado Angle-wing**

P. hylas, a montane species native of the Rocky Mountains and Great Basin, was not recorded from Nebraska in the old papers. I have two specimens from Sioux County, both from Monroe Canyon. One was taken by me on 9 July 1964, and the other by Dr. Nixon on 6 July 1965.

Polygonia satyrus **(Edwards) — The Satyr Angle-wing**

Differentiation of western Great Plains *P. satyrus* and *Polygonia comma* by the maculation of wing undersides can be very misleading. The most reliable wing character for *P. satyrus* is the brightness of the upperside, especially the concise brightness of the hindwings. Specimens reported by Leussler (1938) from the Pine Ridge canyons are in the State Museum at Lincoln. Although I had originally thought differently, I am now of the opinion that the entire stock of recent specimens which have been called *P. satyrus* (Johnson and Nixon, 1967) are best referred to *P. comma.* Thus, rediscovery of *P. satyrus* in the Pine Ridge will prove that the two are sympatric there. Leussler's specimens indicate the typical single brood, all being from mid- to late June. The state range, determined by the old records, is presented in Fig. 13.

Polygonia comma **(Harris) — The Comma**

Consistent with the treatment of *P. satyrus,* I prefer to present *P. comma* as having the statewide range indicated in Fig. 14. This, however, does not explain why the species is not reported from Colorado (Brown *et al.,* 1957) or Wyoming (Clifford D. Ferris, Univ. of Wyoming, study in progress). I have referred the problem to Mr. John Belicek (University of Alberta, Edmonton) who is beginning a zoogeographical study of the genus. *P. comma* in Nebraska occurs as early as April, with summer form *"dryas"* reported by July. A fall brood extends from mid-August to mid-October.

Polygonia interrigationis **(Fabricius) — The Question Mark**

The Question Mark is a familiar butterfly throughout the eastern United States. Although it is not recorded extensively in Nebraska I have no doubt that it occurs throughout the state. Its twenty county records are well distributed over the various areas of Nebraska (Fig. 15). Its temporal distribution is diverse, ranging from early June to mid-October. There may be up to three broods. The species is most easily collected on garden flowers in towns.

Nymphalis antiopa **(Linnaeus) — The Mourning Cloak**

Due to its wide distribution in the United States, *N. antiopa* no doubt occurs throughout the state, though its sporadic periods of flight have left it rather uncommonly recorded. However, its twenty county records occur in all parts of the state. Individuals which hibernated are in the air in late March and the species can still be

taken in October. There seems to be two extensive broods, with the second beginning in mid-July.

Nymphalis milberti (Godart) — **The Milbert's Tortoise Shell**

A species typical of woodlands in the north and western United States, *N. milberti* is essentially limited in Nebraska to the woodlands of the west, where it has been taken in Dawes, Sioux, Sheridan, and Scotts Bluff Counties. However, it has been recorded once from the eastern part of the state (Columbus, Platte County) in the spring of 1934 (Fig. 16). It is very local, sometimes abundant, other times scarce. In the northwest it appears to be tri-brooded, occuring from mid-May to mid-August.

Nymphalis vau-album j-album (Boisduval and LeConte) — **The Compton's Tortoise Shell**

The Compton's Tortoise Shell is known in Nebraska only from Monroe Canyon in Sioux County, where it has been taken both recently and in the past. I have two specimens from there taken on 19 July 1963 and 25 July 1964. On the latter date there were others flying but only one was collected. The old record is in the University of Nebraska Collection and taken on 1 September 1921.

Subfamily Vanessinae

Junonia coenia coenia (Huebner) — **The Buckeye**

Records for the Buckeye are from widely scattered localities in Nebraska (Fig. 17). Old specimens exist from the west in Dawes and Cherry Counties; one of these is undated and the other from Barber (1894). There are more recent records from the east, the most probable area for the occurence of the species, considering its general distribution in the United States. Mr. Froemel has taken it in Columbus, Platte County, a number of times in July, August, and September, indicating the typical two broods. There are records for five other eastern counties, but only one since Leussler's time: Mr. Kohler's specimens from Dead Timber Recreation Area, Dodge County, 12 August 1968. There is also an undated specimen from Buffalo County, in the Kearney State College Collection.

Vanessa caryae **Huebner — The Western Painted Lady**

V. caryae is a Painted Lady characteristic of the western United States. Brown *et al.* (1957) mentioned its easternmost occurrence as being Colorado. It is not a resident of Nebraska but has made at least one invasion into Nebraska's western counties. In 1961, September and October, it was taken quite commonly by Nelson Foster and me throughout the Pine Ridge. It has not been collected since, in any area of the state, and is unreported in any of the old literature.

Vanessa cardui (Linnaeus) — **The Common Painted Lady**

V. cardui is the common Painted Lady of eastern North America. Reported from nearly thirty counties, it is a sporadically common insect in Nebraska. In years when it is common it can be found in

almost any habitat, but in other years it can be a rarity. Adults are on the wing anytime from May to October. It has up to three broods, with extensive overlapping. There is one reported migration of the species in Nebraska, in Scotts Bluff County, 1965 (Howe, 1967).

***Vanessa virginiensis* (Drury) — The Hunter's Painted Lady**

V. virginiensis, another Painted Lady occurring throughout the United States, is reported commonly in both eastern and western Nebraska, but lacks records in the central areas of the state (Fig. 18). This is probably due to oversight since it is often overlooked as *V. cardui* in the field. I assume that if flies everywhere in the state. There are two broods, the first from May to at least late June and the second in mid-July extending into September.

***Vanessa atalanta* (Linnaeus) — The Red Admiral**

The Red Admiral is one of the most widely captured of Nebraska butterflies, reported from nearly sixty counties. There are two broods, with adults emerging during the same time spans throughout the state. The first brood is from early May to mid-July and the second from mid-August through September. Adults of the last brood are less common than the first.

Subfamily Limenitidinae

***Limenitis weidemeyerii* (Edwards) — The Weidemeyer's Admiral**

A species characteristic of the pine forests of the western United States, *L. weidemeyerii* occurs in all the coniferous forest areas of Nebraska's western counties. The Pine Ridge material is subspecies *oberfoellii* Brown. It flies from the second week in June through July and sometimes into August. There is only one sight record from the Wildcat Range, but the species should be common there. I observed the single known record in Wildcat Hills Park, 29 June 1969. Barber (1894) records the species from the pine areas of Cherry County. This butterfly might eventually be found in all the wooded areas of western part of the state (Fig. 19).

***Limenitis archippus* (Cramer) — The Viceroy**

The Viceroy is a familiar butterfly found east of the Rocky Mountains in North America. It ranges across the state of Nebraska. Within any one area it is not a common butterfly but is found most frequently near Willow (*Salix* sp.), its foodplant. In all it has been taken in fifteen counties (Fig. 20), from late May to September. The second brood begins in mid- or late July.

***Limenitis arthemis astyanax* (Fabricius) — The Red-spotted Purple**

This species has a well-defined distribution in eastern Nebraska (Fig. 21), occurring as far north as Dixon County and ranging over the entire eastern area west to Valley and Buffalo Counties. There are records from early May to late September. There are three overlapping broods. Mr. Froemel reported to me in correspondence two hybrid specimens of *L. astyanax* and *L. archippus* from 4 September 1963 in Columbus, Platte County.

Subfamily Hurytelinae

Mestra amymone (Menetries) — **The Amymone**

This butterfly is not a resident of Nebraska; its foodplant, *Tragia* sp., is a tropical variety. The amymone strays north commonly into Kansas and Colorado (Brown, *et al.*, 1957). In Nebraska it has been taken three times in recent years. Mr. Froemel has a specimen from Columbus, Platte County, 20 October 1950; Dr. Stanley Longfellow at Kearney State College has taken it in Kearney, Buffalo County, 7 October 1968; O. D. Spencer collected one at Dead Timber Recreation Area, Dodge County, 22 August 1968.

Subfamily Apaturinae

Asterocampa clyton (Boisduval and LeConte) —

The Tawny Emperor

This species has not often been found but seems to be locally common (Fig. 22). The largest observed series is in the Kearney State College Collection collected in late September, 1967, indicating a fall brood. Mr. Froemel has taken it in Columbus, Platte County, in early Sepember, 1963. There are older June records in the University of Nebraska Collection from eastern counties and Robert Taylor also has two males from Bellevue, Sarpy County, taken on 30 June 1965, indicating an early summer brood. There is a single record from the west, from Sioux County, 30 June 1908 in the University of Nebraska Collection.

Asterocampa celtis (Boisduval and LeConte) complex —

The Hackberry Butterfly

There are two "subspecies" of *A. celtis* in Nebraska. *A. c. celtis* Boisduval and LeConte flies over the entire state in areas where hackberry (*Celtis occidentalis* L.) occurs (Fig. 23). The subspecies *A. c. antonia* Edwards occurs only in the deep canyons of the Pine Ridge. Dr. W. J. Reinthal has reared individuals from eggs of the latter population and was able to obtain adults of both subspecies as well as "infraspecific hybrids." Exactly how this relates to the taxonomic status of the species complex can be known only to a specialist like Dr. Reinthal, and results of the first experiments with rearing were generally inconclusive except to prove that typical *antonia* individuals were present in Nebraska. These latter types may also occur in the Wildcat Range since I have taken them in Lone Tree Canyon, Goshen County, Wyoming, just to the west in the same escarpment. On the plains the typical *celtis* flies from early June to late August, in two broods. The Pine Ridge fauna commonly emerges two or three weeks later than eastern butterflies, usually in late June or early July.

Subfamily Charaxinae

***Anaea andria* Scudder — The Goatweed Butterfly**

There are seven county records for the Goatweed Butterfly which span from extreme west to extreme east: Scotts Bluff, Keith, Lincoln, Rock, Adams, Platte, and Lancaster Counties. I think the rarity of its records is due to its low density. It is never a common butterfly. It may be that it can be found in nearly every county, but one may have to collect an area extensively before coming across any specimens. Mr. Froemel, who has collected in Columbus for many years, has a number of records from that locality. There are two broods in Nebraska; a spring brood from April to late June and a late summer brood from late August through October.

LIBYTHEIDAE

Subfamily Libytheinae

***Libytheana bachmanni* (Kirtland) — The Snout Butterfly**

The Snout Butterfly has been collected in four Nebraska counties. The most recent record is from Fontenelle Forest, Douglas County, 17 August 1968, by Mr. Kohler. Mr. Froemel, in Columbus, Platte County, has taken it in September 1934 and 1935, and there are old records in the University of Nebraska Collection from Lincoln, Lancaster County. Dr. R. W. Dawson, of Pullman, Washington, and formerly of the University of Nebraska at the time of the early expeditions to western Nebraska, has told me of a swarm in Scott's Bluff County on 8 August 1916. Its foodplant, hackberry (*Celtis occidentalis* L.) is widespread in the state.

LYCAENIDAE

Subfamily Plebejinae

***Celastrina argiolus* (Linnaeus) — The Spring Azure**

C. argiolus is a familiar species in both eastern and western areas of North America. I am quite sure that it can be found in every county in Nebraska. It has been reported in varied localities in over thirty counties. It feeds on a variety of hostplants, which helps account for its wide distribution. Specimens of the spring brood, April to May, have not been extensively recorded. Typical summer form specimens, *pseudoargiolus,* are common in June and extend to the third week in July.

***Glaucopsyche lygdamus oro* Scudder — The Silvery Blue**

A species common in the north and western montane areas in the United States, thus far this butterfly has been found only in the coniferous forest of the western counties. Most specimens are best referred to the subspecies *oro* Scudder. It feeds on *Lupinus* and other legumes, and its larval stages are often tended by ants. Its single brood is sometimes common in the Pine Ridge from May to early July, and I saw it in the Wildcat Range in mid-May 1969.

Scolitantides piasus (Boisduval) — **The Arrowhead Blue**

Though the occurrence of this montane species should be expected in the Pine Ridge, there are only a few specimens known from Nebraska. Dr. John C. Downey took the species in Sowbelly and Monroe Canyons, Sioux County, on 26 June 1962, but no other specimens have been found in recent years. Cary (1901) reported capturing the species in both 1900 and 1901 in Sioux County. The foodplant, *Lupinus* sp., grows in abundance in all the Sioux County canyons.

Everes comyntas (Godart) — **The Eastern Tailed Blue**

In 1913, Bethune-Baker examined the maculation and genitalia of North American *E. comyntas* Godart and *E. amyntula* Bdw. He concluded that the species were not conspecific and pointed out distinct differences in the genitalia of the two entities. Clench (in Ehrlich and Ehrlich, 1961) and many other authors, chose to refer all North American specimens to one highly variable species *E. comyntas*. Later, in 1966 (personal correspondence with Dr. John C. Downey), Clench reported this in error and testified to the distinctness of the two taxa. He also mentioned the difficulty in separating the two species by macular patterns and was more exact in the discussion of genitalic differences.

The nominate *E. comyntas* has been recorded from many areas of Nebraska. Dr. John C. Downey, Mr. Michael Christenson, and I examined the genitalia of selected males from throughout Nebraska, some of which exhibited differences in wing patterns. And, particularly since I recorded in 1967 a population of *amyntula valeriae* (TL, Lead, S. D.) in the Pine Ridge, we also examined "known" and suspected *amyntula* from California, Colorado, Illinois, Iowa, South Dakota, and Wyoming.

This study verifies that *E. comyntas* and *E. amyntula* are taxonomically distinct, with characters such as the uncus and aedeagus being diagnostic. This was also Bethune-Baker's opinion. In *comyntas* the uncus has a prominent caudally directed dorso-mesial projection, almost a tooth, and the lateral margins of the uncus are definitely "shouldered." The uncus of *amyntula* tapers gradually and evenly, and there is no evidence of a caudally produced shoulder or hump in its margin. Specimens from throughout Nebraska are genitalicly *comyntas,* as are the specimens available to us from the Black Hills of South Dakota. Since the type locality of subspecies *valeriae* is Lead, South Dakota, and this entity seems to be improperly placed as *comyntas,* it may indicate that *comyntas* and *amyntula* occur sympatrically in the Black Hills. Perhaps they also fly together in the Pine Ridge of Nebraska. Efforts to separate the two entities by macular patterns seem futile, with even the extent of orange lunules on the hindwing not being reliable as a diagnostic feature.

E. comyntas is tri-brooded in Nebraska, with adults on the wing from May through September. This is also indirect evidence of the correct taxonomic assignment of Nebraska forms. Western *amyntula* appear to be single brooded.

***Plebejus (Icaricia) acmon* (Westwood) — The Acmon Blue**

P. acmon is a western species occurring most commonly in the southwestern areas of the western Great Plains. I captured the only recent Nebraska specimen in Chadron, Dawes County, 18 May 1962. Cary (1901) reported the species as common at times in the Pine Ridge canyons in Sioux County.

***Plebejus (Icaricia) shasta minnehaha* (Scudder) — The Alpine Blue**

Both Leussler (1938) and Cary (1901) report this species from Sioux County. I have not seen any of the specimens, but seriously doubt if the insect still occurs in the Pine Ridge. In Colorado, the species is known only from above treeline.

***Plebejus (Icaricia) icarioides lycea* (Edwards) — The Boisduval's Blue**

This butterfly, characteristic of the montane and foothill areas of the western United States, is common in Sioux County where the larval food-plant *Lupinus plattensis* Watts, grows in abundance (Downey, and Fuller, 1961). There is a single brood. The species may enter Dawes County, but no specimens are known from this locale as yet.

***Plebejus (P.) saepiolus* (Boisduval) — The Greenish Blue**

P. saepiolus is a species occurring across Canada and extending southward to the mountain areas of the western United States. There is a single Nebraska specimen known. I captured it on the slope of the Pine Ridge just south of Chadron, Dawes County, on 28 May 1962. It is unrecorded in any of the old literature.

***Lycaeidea melissa* (Edwards) — The Edwards' Blue**

The Edward's Blue occurs throughout Nebraska (Fig. 24). The only area where it has not been reported is in the southeast. It seems to be most common in dryer years. The species begins flying in late May with a second brood beginning in late July and flying until September and October. Western specimens are most like subspecies *melissa* Edwards, but in Custer County, Mr. Running and I found numerous specimens which were very dark, nearly charcoal, on the underside ground color. Genitalically, darker forms are identical to the lighter populations of *L. melissa* and no serious thought was given to erecting a trinomial designation for them, if indeed they are a distinctive population. The species is known for its high variability throughout its wide North American distribution.

***Hemiargus isola* (Reakirt) — The Reakirt's Blue**

This species may well occur in every county in the state. Its records indicate that it is widespread (Fig. 25). It may be overlooked by many collectors who mistake its weak flight and small size for

Everes. The adult flight period for Nebraska material ranges from early May to mid-August, though June seems to be the month in which most adults are taken.

***Leptotes marina* (Reakirt) — The Marine Blue**

This species is essentially subtropical but has extended its range northward in the Mississippi Valley as well as in the southwestern United States. Brown *et al.* (1957) reports it also in Colorado. O. D. Spencer has taken four specimens at Lincoln, in Lancaster County. They are from 29 August 1953--female, 18 October 1953--male, and 12 October 1963--two males. These are the only Nebraska records.

***Brephidium exilis exilis* (Boisduval) — The Western Pigmy Blue**

Essentially a western species, Leussler (1938) reported several specimens from eastern Nebraska. There are only two recent specimens. I took one specimen in Chadron, Dawes County, 28 August 1964. The other was captured by Mrs. Robert Woodley, of Richland, Washington, in Hastings, Adams County, 12 August 1964.

Subfamily Lycaeninae

***Lycaena phlaeas americana* Harris — The American Copper**

Leussler (1938) listed this eastern species as a rarity in eastern Nebraska. E. A. Froemel, of Columbus, Platte County, has the only specimens of this species from Nebraska since Leussler's time, taken in Columbus, 21 May 1939. The food-plant, *Rumex* sp. is not uncommon in the state.

***Lycaena dorcas dorcas* Kirby — The Purplish Copper**

Of the Nebraska material in my possession, nearly all specimens resemble the nominate *L. dorcas dorcas.* A few, notably some in E. A. Froemel's collection and an individual from Grant, Perkins County, 26 June 1969, come very close to the descriptions of *helloides.* Until further research is done into the taxonomy of *L. dorcas* and *L. helloides,* I follow Brown *et al.* (1957) and refer all Nebraska specimens to the nominate *dorcas.* The Purplish Copper has been recorded from various areas of the state (Fig. 26). There are two broods, one in early May through June, and another in August with stragglers flying into early October.

***Lycaena rubidus* Behr — The Ruddy Copper**

Although *L. rubidus* is generally considered a western montane species, it is known to occur well out onto the plains of Colorado and Wyoming (Brown *et al.,* 1957). The same situation occurs in Nebraska. Recently I have taken specimens in the Pine Ridge and Wildcat Range as well as Sheridan County on the plains. Older records, in the University of Nebraska Collection, range as far east as Thomas and Custer Counties (Fig. 27). The species nearly swarms in the Wildcat Range canyons in eastern Wyoming. All specimens are from late June or early and mid-July, an indication of a single brood.

Lycaena xanthoides dione Scudder — The Great Copper

In the southeast, this species has been recorded from every county west to Hastings and north to Columbus (Fig. 28). In these areas it is a common butterfly. The species is less common in the northwest, its other area of recorded occurrence, due probably to the more limited occurrence of its foodplant, *Rumex* sp. Individuals from both areas are clearly *dione* Scudder, which varies little throughout eastern North America. In Nebraska, *L. x. dione* flies from mid-June to mid-July. There is one brood.

Lycaena thoe Guerin — The Bronze Copper

L. thoe is never common but has been reported in fourteen counties well distributed over the state (Fig. 29). There seem to be two broods, one from early to late June and the other from mid-August into late October. It feeds on *Rumex crispus L.*

Subfamily Cerydinae

Feniseca tarquinius (Fabricius) — The Harvester

The Harvester, a species whose larvae are predatory on alder aphids, is an eastern United States entity but is known from several localities in eastern Nebraska. Specimens were captured in 1969 in Gage, Sarpy, and Cass counties by Leonard Running, Steven J. Kohler, and me. The dates of collecting range from 6 May to 26 June, but it should be found throughout the summer. Leussler (1938) reported it in Nebraska also. There are usually two to three broods in the east-central United States (Klots, 1951).

Subfamily Theclinae

Strymon liparops aliparops Michener and dos Possos — The Striped Hairstreak

This species ranges widely over the United States. In Nebraska it has been captured in six counties, all in the western half of the state (Fig. 30). These records are from Sioux, Dawes, Thomas, Cherry, Keith, Dawson, and Chase Counties and range in date from mid-June to mid-July. The Striped Hairstreak is single brooded.

Strymon falacer (Godart) — The Banded Hairstreak

Leussler (1938) reported this eastern Hairstreak from Nebraska in the southeastern counties. There are two recent records: Valentine, Cherry County, 16 July 1968–male, Steven J. Kohler collector; Lincoln, Lancaster County, 6 June 1965–female, Robert Taylor collector.

Strymon edwardsii (Grote and Robinson) — The Edwards' Hairstreak

Leussler (1938) noted a large population at Omaha, Douglas County, in July 1928. A specimen is known from Lincoln, Lancaster County, 24 June 1899. More recently, Steven J. Kohler has taken the

species in Valentine, Cherry County, 16 July 1968. The foodplant is Oak (*Quercus*) which grows commonly in eastern Nebraska and spreads west along the rivers. I have little doubt that this species is more common than indicated.

***Strymon acadica montanensis* Watson and Comstock — The Acadian Hairstreak**

This is a widespread species occurring in Canada and south in the mountains of the eastern and western United States. It ranges widely, often occurring well out onto the plains. It has been captured in thirteen Nebraska counties: in the Pine Ridge, the Niobrara escarpments, the Platte Valley, and the east-central area (Fig. 31). It may occur in every county in the state. Specimens are recorded from mid-June to late July.

***Strymon titus titus* (Fabricius) — The Coral Hairstreak**

Although Leussler (1938) mentions this species as occurring over the entire state, there are few known specimens since his time. Steven J. Kohler is responsible for all of the recent captures: Crete, Lancaster County, 7 July 1968—six males; Cozad, Dawson County, 10-11 July 1968—five males; Valentine, Cherry County, 16 July 1968 —two males.

***Strymon melinus* (Huebner) — The Gray Hairstreak**

The Gray Hairstreak probably occurs in every Nebraska county. It is a common butterfly over the entire area of the United States. Records from Nebraska are from the west, southeast, and south-central areas (Fig. 32). In 1969, Leonard Running and I found it common only in the south-central area where specimens were assignable to the subspecies *humuli* Harris. All eastern material is best applied to this name. In the west, the specimens are more like subspecies *franki* Field, with a lighter ground color on the underside and red-brown edging of the white lines across the disc. These have been captured in Chase County as well as in the Wildcat Range and Pine Ridge. The species can have many broods, specimens ranging in date from early May to late September.

***Strymon cecrops* (Fabricius) — The Red-banded Hairstreak**

Leussler (1938) reported this species from Nebraska, reputedly collected by Albert Cassell in Nebraska City, and H. G. Barber in Nemaha County.

***Incisalia niphon* (Huebner) — The Eastern Pine Elfin**

I. niphon is the Pine Elfin characteristic of the east-coast forests. Barber (1894) reports it from Nemaha County in southeastern Nebraska. There are no recent records, and I have not seen the specimen reported by Barber. The species may now be absent from the state.

***Incisalia eryphon* (Boisduval) — The Western Pine Elfin**

The Western Pine Elfin is a common species throughout the pine forests of the Rocky Mountains. In Nebraska it is found from early

May into July in the Pine Ridge. It can be collected in large numbers near its foodplant, pine (*P. ponderosa* Laws.). I feel sure that the species must also occur in the Wildcat Range, but there is so little spring collecting done in that area that no specimens are known.

***Incisalia henrici* (Grote and Robinson) — The Henry's Elfin**

This is a widely distributed, but local, species in the eastern United States. Leussler (1938) reported it from Omaha, Douglas County. Mr. Kohler has taken it in Barada, Richardson County, in early May, 1969, and in Nebraska City, Otoe County, on 2 May 1969. The species most likely occurs throughout southeastern Nebraska, but lack of early spring collecting there has left limited records for it. Adults should be sought around red-bud trees when they are first blooming.

***Mitoura siva* (Edwards) — The Siva Hairstreak**

A characteristic mountain species of the western United States, *M. siva* has extended its range considerably to the east in Nebraska (Fig. 33). I have taken it as far east as Rock County, in the Western Red Cedar (*Juniperus scopulorum* Sarg.) of the Long Pine State Recreation Area. This area is at least 180 miles from the Wyoming border. The occurrence of the species in the Halsey National Forest across a wide prairie barrier is more difficult to explain. Perhaps it was introduced as ova on cedar seedlings. I have captured it commonly also on the cedar-covered bluffs above Kingsley Dam, in Keith County. The species is commonly found in both the Pine Ridge and Wildcat Range, and from these localities ventures out onto the plains. The adult flight period for this single-brooded species ranges from late May through late June.

PIERIDAE

Subfamily Euchloeinae

***Euchloe olympia rosa* (Edwards) — The Olympian Marble**

The Olympian Marble is a woodland species occurring throughout the midwestern United States. In Nebraska it has been captured in six counties (Fig. 34). In the west I have capured it throughout the pine forest areas as far east as Rock County. In the east, it has been taken in the deciduous forests of Platte and Nemaha Counties. It flies in one brood from early May to early June. The species feeds on Cruciferae.

***Euchloe ausonides coloradensis* (Edwards) — The Colorado Marble**

This is a western montane representative of the Marble group. Cary (1901) and Leussler (1938) report it in the Sioux County canyons. Though it has never been captured there in recent times, there is no apparent reason why it should be missing. It can be found throughout the summer in eastern Colorado. Perhaps the species has been overlooked as *E. olympia* or other Pierids. This would explain the lack of other and recent records.

Anthocaris genutia (Fabricius) — **The Falcate Oragne-tip**

The Falcate Oragne-tip, an essentially eastern United States species, has been captured in Nebraska by Mr. Froemel in Columbus, Platte County. His single male specimen is from 1 May 1938.

Subfamily Coliadinae

Nathalis iole **Boisduval — The Dainty Sulphur**

N. iole is a small sulphur occurring throughout the United States. It is reported in ten scattered counties in Nebraska, as far west as Dawes County in the Pine Ridge, to Nemaha County in the southeast (Fig. 35). Many of the more recent records are from the south-central and southwest. There are two broods, one from mid-June to mid-July and the other in the fall, beginning in late August and extending into November.

Eurema nicippe nicippe (Cramer) — **The Sleepy Orange**

E. nicippe is very common in the southern United States and is much less frequently encountered at the northern margins of its distribution. There are few records for this species in Nebraska. There is a specimen from Lincoln, Lancaster County, 23 October 1910, and one from McCook, Red Willow County, 20 June 1913 in the University of Nebraska Collection. Barber (1894) reported a specimen from Saunders County.

Eurema lisa lisa **Boisduval and LeConte — The Little Sulphur**

This common eastern United States species has been collected a number of times in recent years in southeastern Nebraska; as far north as Cuming County and south to Nemaha County (Fig. 36). The Platte County records are the farthest west. There are two broods, one in mid-June through July and another beginning in early August.

Eurema mexicana (Boisduval) — **The Mexican Sulphur**

E. mexicana is a resident of many southeastern and western states in the United States. In Nebraska there are records from eight counties. In the east it is probably a resident, but specimens from the west are generally tattered and probably blown in by the wind. In western Nebraska the butterfly has been captured in Dawes, Sioux, and Logan Counties and in the east in Lancaster, Dodge, Sarpy, and Douglas Counties. The records vary in time or year, some from mid-July but the bulk from September and October. The species usually has two to three broods, but there is much overlapping.

Kricogonia lyside (Godart) — **The Lyside**

K. lyside is a southern species which on occasion invades Nebraska, Kansas, and Colorado. Leussler (1938) reported specimens from Lancaster County in eastern Nebraska. It is likely that the species strays into Nebraska, but no recent specimens are known.

Phoebus sennae eubule (Linnaeus) — **The Cloudless Sulphur**

A common species in the southeastern United States, the Cloudless Sulphur has a rather well-defined range in southeastern Nebraska.

It has been found as far north and west as Platte County and is reported, especially in the old literature, in five other southeastern counties (Fig. 37). In recent times, records for the species have become fewer. Nearly all the dates of collection range from late July through mid-September. There are usually two broods in the eastern United States (Klots, 1951).

***Phoebus agarithe* (Boisduval) — The Cloudless Orange Sulphur**

E. A. Froemel, of Columbus, writes that he has specimens very much like this taxon in his collection from Columbus, Platte County: a male from 7 July 1940 and a female from 6 July 1941. Brown *et al.* (1957) reports two specimens from Colorado and Leussler (1938) cites a record from Dodge County. The species is essentially southern in distribution.

***Anteos maerula* (Boisduval) — The Yellow Angled Sulphur**

A species native to southern Texas, *A. maerula* is known to stray north on occasion (*e. g.* Colorado, Brown *et al.*, 1957). Leussler (1938) reports a specimen taken by him at Omaha, Douglas County, 20 September 1921. I assume this specimen was a stray and the species is not a regular Nebraska resident.

***Colias (Zerene) caesonia caesonia* (Stoll) — The Dog's Head Sulphur**

The Dog's Head Sulphur is a species characteristic of the eastern United States, occurring west to Colorado and eastern Wyoming. In Nebraska it flies in the coniferous forests of the west and is also reported frequently from the southeastern counties. There are old records from the Pine Ridge and recent records from the Wildcat Range. In the east there are old records west to Adams County and throughout the lower Missouri Valley (Fig. 38). Mr. Froemel, in Columbus, Platte County, has collected it numerous times. The Nebraska records are mostly from September, though there are June records and the Wildcat Range specimens are from mid-July. There are three broods of the species in eastern North America (Klots, 1951).

***Colias alexandra* Edwards — The Queen Alexandra's Sulphur**

C. alexandra is a species characteristic of the Rocky Mountains. It has entered Nebraska in both the Pine Ridge and Wildcat Range. Although the species is reputedly single brooded, there are specimens from June, July, and August. The majority of the records, and all the recent ones, are from June. I am sure that the butterfly is more common than the records indicate. Its appearance is so close to *C. philodice* on the upperside that most collectors may pass it up, especially since Nebraska is a state where its occurrence would not ordinarily be expected.

***Colias philodice* Godart — The Clouded Sulphur**

C. philodice is a common species throughout the United States.

It has been captured in nearly eighty Nebraska counties. There are three overlapping broods from April through November. It will feed on clover (*Trifolium* sp.), alfalfa (*Medicago* sp.), and lupine (*Lupinus* sp.).

***Colias eurytheme* Boisduval — The Alfalfa Butterfly**

A species characteristic of the entire United States, this butterfly has been collected in some eighty counties throughout the state of Nebraska. It flies from early April until late November, weather permitting. There are several broods.

Subfamily Pierinae

***Pieris rapae* (Linnaeus) — The European Cabbage Butterfly**

The Cabbage Butterfly is a common butterfly in all areas of the United States. In Nebraska it has been captured in some seventy counties. There are several broods with adults on the wing from March to November. Merritt Cary (1901) reported a specimen of *Pieris napi* L. from the canyons of Sioux County. I do not include it since there is usually a strain of very light *P. rapae* occurring in that area in the spring, and the possibility of misidentification is suggested. Furthermore, the specimen could not be located in the Cary collection at the University of Nebraska.

***Pieris protodice* Boisduval and LeConte — The Checkered White**

P. protodice, a common eastern United States species, has been taken in thirty-two widespread counties in Nebraska. The species can be found nearly everywhere. There are at least three broods; specimens have been captured from late May to late September.

***Pieris sisymbrii* Boisduval — The Colorado White**

This is a montane taxon characteristic of the Rocky Mountains, but occurring east in escarpment areas in both Colorado and Wyoming (F. M. Brown, in correspondence). It flies annually in the Pine Ridge from late April to late May in a single brood. I have seen it locally common on early April days, but usually it is infrequent. Specimens from the Pine Ridge and from eastern Wyoming and Colorado may prove to be a new subspecies (Johnson and Nixon, 1967). More specimens are needed, however, for such an evaluation.

***Appias drusilla* (Cramer) — The Florida White**

A. drusilla is a native of southern Florida and Texas and occasionally strays northward. Leussler (1938) reports taking a specimen at Omaha, Douglas County, 19 August 1909. This species has strayed into Colorado (Brown, *et al.,* 1957) and additional records from Nebraska are quite possible.

***Neophasia menapia* (Felder and Felder) — The White Pine Butterfly**

N. menapia is a Rocky Mountain species occurring commonly east to the Black Hills of South Dakota and Nebraska's Pine Ridge. Dr. Nixon has taken the most recent specimens, from Monroe Canyon in Sioux County, 8 August 1965. Klots (1951) reports the species as far east as Sioux City, Iowa, on the Missouri River, but I am sure that the Pine Ridge forests are its nearly exclusive Nebraska habitat.

PAPILIONIDAE

Subfamily Papilionidae

Graphium marcellus **(Cramer) — The Zebra Swallowtail**

The Zebra Swallowtail is an eastern taxon occurring from Florida to Wisconsin (Klots, 1951). There are a number of recent records for this species in extreme southeastern Nebraska (Fig. 39). It has been collected in Nemaha County both by early collectors and recently by Dr. Longfellow, at Peru, 7 July 1958. In Richardson County, Nebraska's south-easternmost county, it has been captured several times by Mr. Kohler, in Barada, early May, 1969. The species is several brooded. It feeds on Papaw (*Asimina* sp.).

Papilio palamedes **Drury — The Palamedes Swallowtail**

A species characteristic of the southeastern United States, Leussler (1913, 1938) reports one specimen taken in Omaha, Douglas County, and one from Dodge County. There are no dates given.

Papilio troilus troilus **Linnaeus — The Spicebush Swallowtail**

This species gains its name from its most common foodplant, Spicebush, (*Benzoin* sp.). Leussler (1913, 1938) reports one specimen from Omaha in Douglas County, 27 April 1913. The taxon is essentially southeastern in its United States distribution.

Papilio multicaudatus **Kirby — The Two-tailed Tiger Swallowtail**

A western taxon, this Tiger Swallowtail ranges east in Nebraska much farther than once thought by lepidopterists (Fig. 40). It is the common Tiger Swallowtail in the Pine Ridge and Wildcat Range, but also flies east along the Niobrara escarpments and into Nebraska National Forest in Thomas County. Leussler (1938) mentioned its occurrence in Valentine, along the Niobrara River in Cherry County. This, however, has not been its eastern limit. Barber (1894) reported it from Custer County, and Dr. Longfellow at Kearney State College has taken it at Kearney, Buffalo County, 21 September 1967. This is well past the state's midline. There is also one other record for the species far to the east, Bellevue, Sarpy County, along the Missouri River, 1 May 1910. In the west there are two broods, one in early May into July and again a brood in early August.

Papilio rutulus **Boisduval — The Western Tiger Swallowtail**

This is the common Tiger Swallowtail in western areas of the United States. It may occur in the Pine Ridge or Wildcat Range. Cary (1901) reports several on 10 July 1901 in Monroe Canyon, Sioux County.

Papilio glaucus **Linnaeus — The Eastern Tiger Swallowtail**

This species is the common Tiger Swallowtail in eastern Nebraska. It has been captured in nearly every county in the state's eastern third, and ranges as far west as Buffalo and Valley Counties (Fig. 41). There are at least two broods, one in early spring ranging through mid-July, and another in August.

***Papilio cresphontes* Cramer — The Giant Swallowtail**

A common butterfly in the southern United States, Leussler (1938) reported this species in Nebraska as "not uncommon in the east." Mr. Froemel has three specimens from Columbus, Platte County, 19 October 1963, and two others from 23 July 1939 and 30 July 1954. The University of Nebraska Collection has two specimens, both females, from 30 August 1909 and 19 September 1921. These were taken in Lincoln, Lancaster County. Barber (1894) mentions it from several eastern Nebraska counties. The species distribution is shown in Fig. 42.

***Papilio indra* Reakirt — The Short-tailed Black Swallowtail**

A species characteristic of the western United States and montane areas, there are old records for it in both the Pine Ridge and Wildcat Range. The Pine Ridge specimen is a male from Monroe Canyon, 31 May 1900. It was taken by one of the early University expeditions. Leussler took the insect in the Wildcat Range, near Harrisburg, Banner County, 2 June 1919. This specimen is in the Ohio State University Collection.

***Papilio zelicaon* Lucas — The Zelicaon Swallowtail**

Another swallowtail of the western United States, *zelicaon* is found frequently in the spring in the Pine Ridge. It has spread its eastward range surprisingly. There are old specimens from the Wildcat Range and recent captures are from Paxton, Keith County, 5 April 1964. The latter are in the Kearney State College Collection. A spring brood is common in the Pine Ridge, flying from at least early May on through the month. The only summer brood specimen is the Wildcat Range specimen dated August 7 (no year given).

***Papilio nitra* Edwards — The Nitra Swallowtail**

A northwestern United States species, *P. nitra* is extremely rare eastward to Colorado (Brown, *et al.*, 1957) Leussler (1938) reports one specimen from Bull Canyon near Harrisburg, Banner County, 2 June 1919.

***Papilio polyxenes asterius* Cramer — The Black Swallowtail**

I am sure that *p. asterius*, the common Black Swallowtail of the United States, flies in every county in Nebraska. Its fifteen county records are widespread (Fig. 43). It is never common, at least in comparison to the Tiger Swallowtails, but its two broods span the summer. The first is in early May, perhaps the most common, and the second in mid-July.

***Battus philenor* (Linnaeus) — The Pipevine Swallowtail**

B. philenor gains its name from its most common foodplant, Pipevine (*Aristolochia*). There are a number of specimens in the University of Nebraska Collection, all from mid-July 1914. All these specimens are from Lincoln, Lancaster County. There is also a

specimen, reputedly from Hastings, Adams County, in the Hastings Museum. The species is usually localized by the occurrence of its foodplant.

Subfamily Parnassinae

***Parnassius phoebis sayii* Edwards — The Parnassian**

The Parnassians are tail-less members of the Papilionidae and are found in the northern and mountain areas of the Holarctic realm. Several series of *P. p. sayii* are in the University of Nebraska Collection from various canyons in Sioux County. They are all from the early 1900's. There have been no recent captures, but I made a sight record from Monroe Canyon, Sioux County, 2 July 1964.

Note on *Papilio*:

Merritt Cary (1901) reported a specimen of *Papilio bairdii* from Sioux County. This must be misidentification, but the specimen has since disappeared and cannot be checked. *Papilio bairdii* is known to occur east of the continental divide in only a few rare and isolated populations (F. M. Brown, in correspondence). I do not include the species in the state list.

HESPERIIDAE

Subfamily Pyrginae

***Epargyreus clarus* (Cramer) — The Silver-spotted Skipper**

A common United States species, I have little doubt that it flies throughout the state of Nebraska. Its seventeen county records range from border to border (Fig. 44). There are two broods: from mid-May to late June and from early September to early October.

***Thorybes pylades* (Scudder) — The Northern Cloudy Wing**

A species characteristic of woodlands throughout the United States, the Northern Cloudy Wing is a common catch in the coniferous forests of the western part of Nebraska. It is also recorded as far east as Columbus in Platte County. It flies from late May to late June. There seem to be two closely associated broods.

***Thorybes bathyllus* (Abbot and Smith)—The Southern Cloudy Wing**

An eastern member of the genus *Thorybes*, this species has been captured in four east-central counties, all within the first week of June. The counties are Platte, Dodge, Washington, and Saunders.

***Staphylus mazana hayhurstii* (Edwards) — The Southern Sooty Wing**

Klots (1951) mentions this species from Omaha, in Douglas County. The species was once thought to be a true sooty wing and was placed in the genus *Pholisora*. Mr. Froemel, in Columbus, Platte County, has four specimens: 30 June 1965, 30 May 1938, 5 August 1941, and 7 August 1957, all from Columbus.

***Erynnis juvenalis* (Fabricius) — The Juvenal's Dusky Wing**

The genus *Erynnis* includes a number of species of widespread occurrence across the United States. The original foodplant seems to

have been oak (*Quercus* sp.), but the various species have radiated into both general and specific habits as to choice of foodplant (Burns, 1964). Some feed on willow and poplar, and others on forbs. *E. juvenalis* has been mentioned in Nebraska by Klots (1951). He no doubt refers to Leussler's specimens from Omaha in Douglas County reported in his 1913 paper, and to Leussler's mention of its "general" distribution in his annotated list of 1938 and 1939. I have no experience with it in the state.

Erynnis horatius (Scudder and Burgess)—**The Horatius Dusky Wing**

An eastern United States erynnid, Leussler (1938) reports specimens from Early May and late summer in Saunders, Douglas, and Otoe Counties.

Erynnis martialis (Scudder and Burgess) —
The Martial's Dusky Wing

E. martialis is a prairie erynnid of widespread occurrence in the United States. Dr. Nixon captured two specimens in the Pine Ridge just south of Chadron on 19 June 1965. Leussler (1938) reports other specimens from Douglas and Thomas Counties.

Erynnis zarruco funeralis (Scudder and Burgess) —
The Funereal Dusky Wing

This taxon is of southern distribution in the United States. Two specimens are known from the state, one mentioned in Leussler (1938) from Cedar Bluffs, Saunders County, 30 May 1913 and another from Fremont, Dodge County, 30 May 1921.

Erynnis lucilius afranius (Scudder and Burgess) —
The Columbine Dusky Wing

E. lucilius is a northern erynnid which feeds of columbine (*Aquilegia*). The subspecies *afranius* is typical of the Black Hills of South Dakota. Specimens from Nebraska have been determined by Dr. John M. Burns of the Harvard Museum. It is sometimes common in the Pine Ridge canyons from mid-July to early August.

Erynnis persius (Scudder and Burgess) — **The Persius Dusky Wing**

Distribution records for this widespread species are scattered. In the Pine Ridge it can be found frequently from early May to mid-June. There are two eastern records: from Platte County, 18 June 1939, and Washington County, 5 June 1969.

Erynnis brizo (Boisduval and LeConte) — **The Brizo Dusky Wing**

This species feeds on scrub oak (*Quercus llicifolia*), and has been found in only two Nebraska counties. Leussler (1938) reports a few specimens from Omaha, Douglas County, and Weeping Water, Cass County, taken between April 23 and May 15.

Pyrgus communis (Grote) — **The Common Checkered Skipper**

P. communis is a common skipper throughout the United States, being reported from thirty-three Nebraska counties. It has many broods, flying from mid-May to September. It can be collected

commonly in almost any habitat and is, at certain times, the most common butterfly of the season.

Pholisora catullus **(Fabricius) — The Common Sooty-Wing**

This common skipper has been taken in forty counties throughout the state. There are two broods, overlapping, from mid-May to late July. It is commonly taken along roadsides and in open spaces, the species rivals *P. communis* in density.

Subfamily Hesperiinae

Ancyloxipha numitor **(Fabricius) — The Least Skipper**

A common small skipper in the eastern United States, *A. numitor* has been captured in several eastern Nebraska localities. Mr. Froemel has taken it in Platte County and Leonard Running and I have a number of specimens from Gage, Dodge, Thayer, and Jefferson Counties. It is a weak flyer and commonly flies amidst weeds and grasses where it may be overlooked.

Oarisma garita **(Reakirt) — The Garita Skipperling**

O. garita is essentially a western species, characteristic of the Rocky Mountains. Among the many *O. powesheik* that can be found in the Pine Ridge, a few *garita* occur. The species flies from mid-June to early July.

Oarisma powesheik **(Parker) — The Powesheik Skipperling**

This is a skipperling common in the midwestern United States. It can be found commonly in the dry canyon meadows of the Pine Ridge from mid-June to early July.

Hylephila phyleus (Drury) **— The Fiery Skipper**

A southern United States taxon, Mr. Froemel has specimens from Columbus, Platte County, 21 July 1939, and 28 July 1940. Leussler (1939) reports it as rare in the extreme southeastern counties of the state.

Yvretta rhesus **(Edwards) — The Rhesus Skipper**

Y. rhesus is a plains species characteristic of the southwestern United States. In recent years this species has been taken in the western part of Nebraska. I have specimens from Chadron, Dawes County, 10 June 1961, and 12 May 1962, and also from Bridgeport, Morrill County, 16 May 1965.

Hesperia attalus **(Edwards) — The Dotted Skipper**

This is a widespread species in the eastern United States, but is known from only one county in Nebraska. Leussler (1939) reports several specimens from the eastern part of the state: one female, Omaha, Douglas County, 21 June 1913, and two females and a male, from the same locality, 17 June 1922.

Hesperia ottoe **Edwards — The Ottoe Skipper**

H. ottoe is a very rare skipper in Nebraska, as it is throughout the prairies of the central United States. Most of the records in Nebraska are old. Klots (1951) lists it from Omaha, Douglas County,

and Richard Heitzman has told me of specimens taken at Ogallala, Keith County, 27-28 June 1949. The only other records are Leussler's: Monahan Lake, Cherry County, 22 July 1911; Waneta, Chase County, 12 June 1923; Omaha, Douglas County, 27 June 1925; Pilger, Stanton County, 26 August 1925.

***Hesperia pawnee* Dodge — The Pawnee Skipper**

H. pawnee is similar to *H. ottoe*, only the genitalia being truely diagnostic. Leussler's Collection at Ohio State University houses the only representatives of this species from the state. He captured them in Loretto, Boone County, 1 Sepember 1898, and Pilger, Stanton County, 2 September 1922.

***Hesperia pahaska pahaska* Leussler — The Pahaska Skipper**

Leussler (1938) named *H. pahaska* from specimens captured in canyons in Sioux County, Nebraska. The skipper is quite frequently caught in the Pine Ridge and Wildcat Range. It flies from the last week in June to early August. It can be found nearly anywhere in the forested areas, often high on the buttes.

***Hesperia comma colorado* (Scudder) — The Colorado Skipper**

Leussler (1938) reports this species in Nebraska "on the western plains." I have not found it there, but Brown *et al.* (1957) indicates that it ranges into southern Wyoming. It should be sought in Nebraska, especially in the Wildcat Range and other areas adjacent to southeastern Wyoming.

***Hesperia uncus* (Edwards) — The Uncus Skipper**

This species is not common in Nebraska, though it has a number of widely scattered records in the western part of the state (Fig. 45). Richard Heitzman reports specimens from Ogallala, Keith County, 27-28 June 1949. Leussler (1938) reports it in several western counties, and I have taken it in the Pine Ridge, in Dawes County.

***Polites mystic dacotah* (Edwards) — The Dakota Skipper**

P. mystic is a species characteristic of the northeastern United States, ranging southward to Virginia (Klots, 1951). I have two males of the subspecies *dacotah* from the Pine Ridge. These are the only recent Nebraska records, though Leussler (1939) reported it in Sioux County. My specimens are from Kings Canyon, Dawes County, 11 and 29 July 1965.

***Polites manataaqua* (Scudder) — The Cross Line Skipper**

This species may prove to be quite generally distributed in Nebraska. It has been taken in four widespread localities. The records are: Kings Canyon, Dawes County, 29 July 1965—two females, Dr. Nixon collector; Stapleton, Logan County, 23 June 1969, K. Johnson collector; and Columbus, Platte County, four records mid-June to early July, Mr. Froemel.

***Polites themistocles* (Latreille) — The Tawny-edged Skipper**

The Tawny-edged Skipper is common throughout Nebraska and the entire eastern United States. It has been captured in thirty

widespread counties, mostly in the eastern and central counties of the state (Fig. 46). There are two broods, not well defined, specimens being known from late May to early August.

Polites peckius **(Kirby) [= coras (Cramer)] — The Peck's Skipper**

This is a common skipper in the eastern United States and in southeastern Nebraska. It is reported from a dozen counties in east-central and southeastern parts of the state. I also have a specimen from the west, taken at Grant, Perkins County. The statewide distribution of *peckius* is shown in Fig. 47. There are many broods, the species flying from late May commonly to late June with some stragglers to late July. The Grant specimen is from 26 June 1969. There is little apparent reason why the skipper should not extend its distribution westward. It feeds on various grasses.

Wallengrenia otho egeremet **(Scudder) — The Broken Dash**

W. otho is an eastern United States species. Leussler (1939) reports it from Omaha, Douglas County. Mr. Froemel has four males from Columbus, Platte County, taken on 23 July 1939.

Pompeius verna **(Edwards) — The Little Glassy Wing**

Though *P. verna* is distributed throughout the eastern United States, it has been recorded only a few times in Nebraska. Leussler (1939) reports two specimens from Omaha, Douglas County, 3, 5 July 1912, and another from Plattsmouth, Cass County, 26 June 1930.

Atalopedes campestris **(Boisduval) — The Sachem Skipper**

A. campestris is a tropical skipper which extends north in the spring and produces a resident fall brood occurring in September and October. In Nebraska it has a wide distribution, east to Platte County, west to the Colorado border and north to the Pine Ridge. There are two broods wherever the species is a year-round resident. Brood one appears in June. In cases where the species is transient, June specimens blown northward produce a second brood in September and October which do not survive the winter. This is the case in Nebraska. In recent years records from the southwestern parts of the state are most frequent (Fig. 48).

Atrytone delaware delaware **(Edwards) — The Delaware Skipper**

This is a widespread species in the eastern United States, and taken at various points in Nebraska. I have specimens from Western, Saline County, 19 June 1969, south of Western, Jefferson County, 19 June 1969, and to the west, in the Wildcat Range, some specimens from just over the Wyoming border, 13 July 1964. No doubt the species is more widespread than these records indicate.

Atrytone arogos **(Boisduval and LeConte) — The Arogos Skipper**

A. arogos ranges widely but locally in the eastern United States (Klots, 1951). Leussler (1939) reports this species from several Nebraska localities: Douglas, Cuming, Red Willow, and Custer Counties. In more recent times, I have a specimen from Thayer

County, near Chester, 17 June 1965. Klots (1951) lists a specimen from South Sioux City, in Dakota County.

***Poanes taxiles taxiles* (Edwards) — The Taxiles Skipper**

P. taxiles is a western taxon, occurring from Nevada and western Nebraska southward (Brown *et al.*, 1957). It can be found very commonly in mid-summer in the Pine Ridge canyons. It flies from mid-June to the first week in August. Extreme sexual dimorphism is characteristic of the species.

***Poanes zabulon* (Boisduval and LeConte) — The Zabulon Skipper**

I found a single specimen of this woodland taxon in the Kearney State College Collection, from Kearney, Buffalo County, 18 September 1967.

***Poanes hobomok* Harris — The Hobomok Skipper**

P. hobomok is an eastern United States species seldom occurring to the west. It has been collected in many areas in eastern Nebraska from as far north as Dixon County to Thayer Couty in the south. There is also a curious record far to the west, from Chadron, Dawes County, taken by me on Spruce, 12 June 1965. This record makes the distribution of the species in the state rather disjoined (Fig. 49). The specimen is in the Richard Heitzman Collection, Independence, Missouri. In Nebraska, *P. hobomok* records have dates ranging from late May to mid-June.

***Euphyes vestris vestris* (Boisduval) — The Dun Skipper**

A common species throughout the United States, the Dun Skipper is common in the coniferous forests of western Nebraska from late June to early August. There are also a few records from eastern counties, all taken by Leonard Running and me in 1969: Beatrice, Gage County, 18-19 June; Lake Alexandria, Jefferson County, 20 June.

***Euphyes bimacula* (Grote and Robinson) — The Two Spotted Skipper**

Leussler (1939) reported this northern species as very local in eastern Nebraska. He captured it at Omaha and Valley, Douglas County, in early July.

***Euphyes conspicua* (Edwards) — The Black Dash**

A widespread species in the northeastern United States spreading west to the plains, Leussler (1939) reports this species in late June and mid-July in several eastern localities, all in Douglas County.

***Euphyes dion* (Edwards) — The Dion Skipper**

In the eastern United States, *E. dion* occurs widely but locally. In Nebraska, Leussler (1939) records the species as being "not uncommon locally" from late June to mid-July in Douglas County. I have no recent experience with the species in the state.

***Atrytonopsis hiana* (Scudder) — The Dusted Skipper**

A. hiana is a common spring species throughout the forested areas of western Nebraska, where it flies in the scattered grasslands

among the pine stands. It has been taken in Sioux, Dawes, Scotts Bluff, Banner, and Cherry Counties all within coniferous forest (Fig. 50). It occurs from mid-May to mid-June in a single brood.

Amblyscirtes vialis (Edwards) — **The Common Roadside Skipper**

This species very likely ranges over the entire state. It is a common species in much of the United States. I took it often in 1969 in five eastern counties: Knox, Cedar, Dixon, Gage, and Platte. It has also been captured in the Pine Ridge. All of my records are from early to mid-June. This skipper is single brooded over most of its northern range (Klots, 1951).

Amblyscirtes nysa (Edwards) — **The Nysa Roadside Skipper**

This is a southern species occurring commonly in Texas and spreading north into Kansas (Klots, 1951). I have one specimen from Nebraska, taken by me at Rulo, Richardson County, 18 June 1969.

Amblyscirtes oslari (Skinner) — **The Oslar's Roadside Skipper**

A. oslari occurs in the southwestern United States north along the western edges of the Great Plains. Leussler (1939) reported it as common in the Pine Ridge and along the coniferous escarpments into Cherry County. I have one specimen that I collected in Monroe Canyon, Sioux County, 18 July 1963. I am sure the species must be more common but simply overlooked as *E. vestris.*

Lerodea eufala (Edwards) — **The Eufala Skipper**

Leussler found this species common at times in eastern Nebraska counties in September and October. It is a familiar skipper of the southeastern United States. Its possible common occurrence in eastern Nebraska is substantiated by Mr. Froemel's several records from Columbus, Platte County, from August to November, 1940-1958. I have never collected in eastern Nebraska in the fall, but it should be sought at that time.

MEGATHYMIDAE

Megathymus streckeri texanus Barnes and McDunnough — **The Giant Texas Skipper**

Megathymidae is a family of large skippers which feed as borers on various species of the genus *Yucca.* Nebraska specimens have been referred to as *M. leussleri* in the older literature. There are records by Leussler from two counties: Valentine, Cherry County, 7 June 1914, and 14 June 1937, with a note that "many specimens were taken in the Sandhills." His specimens are at the Ohio State University.

SUMMARY AND CONCLUSIONS

Faunal and Distributional Data:

During the present study, 167 species of butterflies were noted as occurring within Nebraska. The number of known butterfly species captured in Nebraska ranks fourth only to Colorado's 248 species (Brown *et al.* 1957), California's 208 species (Comstock, 1927), and Wyoming's 194 species (Ferris, 1971). Nebraska also has more species than its southern neighbor, Kansas, where Field (1938) lists 155 taxa, or its eastern neighbor, Iowa, where Christenson (1971) lists 130 taxa. Of course, species may have been added or deleted in some of these states in more current research.

Though Nebraska exhibits a large butterfly fauna, the majority of the species in the fauna are not readily collected. The ecology, and hence the collecting conditions, has changed through the years and this change has been more rapid in recent times. For example, when I collected in the Pine Ridge with Dr. R. W. Dawson, formerly of the University of Nebraska and a collector in these areas in the early 1900's, he mentioned repeatedly that collecting was far less productive than it was in earlier times.

The early collections in the western part of the state were made when the Pine Ridge and the areas around it were sparsely settled and generally undisturbed. There were a number of western montane taxa occurring there that have not since been recorded. These include: *Papilio rutulus, Papilio indra, Plebejus shasta, Neominois ridingsii, Melitaea pola,* and *Speyeria atlantis.* Also taken in the early days were species that have been found only in small numbers in recent years. These include: *Parnassius phoebis, Neophasia menapia, Plebejus acmon, Cercyonis oetus, Cercyonis meadii, Speyeria zerene,* and *Speyeria callippe.* Other western montane species found commonly during both time periods include *Speyeria coronis, Oeneis uhleri, Speyeria edwardsii, Limenitis weidemeyerii, Plebejus icarioides, Euphydryas anicia, Papilio multicaudatus, Hesperia pahaska,* and others. Some species, like *Colias alexandra, Lycaena rubidus,* and *Mitoura siva* show evidence of becoming more established than was indicated in the early literature. Generally, it seems that those species which have remained common are the species with the least restricted food plants and niches: *Oeneis uhleri* feeding on the common grasses in the canyons, *Limenitis weidemeyerii* on

willow and cottonwood, the speyerids on violets, and *Plebejus icarioides* on the ever present genus *Lupinus*. However, butterflies with more restrictive niches seem to be those no longer established. These include native prairie species *Neominois ridingsii, Hesperia ottoe,* and *Melitaea pola,* and *Papilio indra,* a wilderness species occurring in secluded canyons in the Rocky Mountains. Similarly, eastern Nebraska niches for skippers such as *Atrytone arogos* and *Euphyes bimacula* seem to have disappeared.

After the early university expeditions, there was a forty-year gap between periods of thorough collecting in the state. Some species are recorded only from the period of university collections (1890-1920) and then again between 1960 and 1969. This latter period is that of my own intensive collecting in the state. Therefore many of the recent records constitute "rediscoveries" while some early records remain as the only known data on a species. Similarly, a few species are known only from recent records.

It seems desirable to compare the percentage of butterflies collected in the early days to the fauna of recent years. About 18% of the Nebraska butterfly fauna are known only from early records. About 5% are known only from recent records. It may be that early collectors missed the 5% by chance. In all cases, the taxa making up this percentage are known only from one or two specimens which may be "strays," accidental imports, or samples of very small populations. Nearly all of these rare recent discoveries are species whose home ranges are in the extreme western United States. The 18% known only from older records, however, include many whose local residency was once well established. This is a strong indication that a real change in fauna has occurred, and that this change can be related to the fact that some ecological niches have been destroyed. This includes more easily documented changes like that of the native prairie-breeding species mentioned previously, and the disappearance of Pine Ridge representatives of western taxa like *Papilio indra, Plebejus shasta, Cercyonis meadii,* and *Speyeria atlantis.*

One conclusion these data substantiate is that the number of species of Rhopalocera is decreasing in Nebraska. Experienced collectors within the state report that fewer species are found every year and that density for many species is consistently decreasing. Even in the Pine Ridge, collecting can be very erratic in productivity. Of course, adult behavior is strongly influenced

by local weather, and the emergence of broods is very sensitive to temperature, moisture, and other environmental factors. However, to the field collector the observation of decreasing density year to year seems obvious. Thus, collectors have found species like *Pieris sisymbrii, Euphydryas anicia,* and *Oeneis uhleri* common in certain years but apparently absent in others. Likewise, many of the extremely western montane taxa seem to have disappeared completely. After repeated efforts to locate these rarities, one can only conclude that their populations are extinct or only present in isolated, and yet uncollected areas.

The number of species losses should not be considered without discussing species gains in the state. The number of new species records added to the state lists in recent years from the Pine Ridge is small. It includes only *Polygonia hylas, Plebejus saepiolus, Vanessa caryae,* and *Phyciodes mylitta.* The occurrence of *Vanessa caryae* can be explained by the migratory habits of that genus. Two of the other records might possibly be misidentifications: I have identified certain *Polygonia* as nominate *hylas* on the basis of greenish colorings beneath, and likewise the group of specimens I have referred to the nominate *Phyciodes mylitta* might by some chance be extremely aberrant *P. tharos. Plebejus saepiolus* is most likely an oversight by the early collectors. Several of the Plebejinae mentioned in the annotated list occur frequently in the Pine Ridge and suitable biomes for them are not uncommon. As has been noted, the most easily documented cause for the extinction of some populations seems to be niche destruction. Although due mainly to land use, such influences are not entirely negative. In any area, land use affords floral divergence and also new margins. This leads to new arrays of available nectar sources and thus new sympatries between populations. More importantly, it influences the establishment of whole new environments and with them new communities of biota on a large scale. While land use has led to the loss of montane taxa in the west, the planting of new forests eastward has afforded extensions for such taxa as *Mitoura siva, Atrytonopsis hiana, Euchloe olympia,* and *Papilio multicaudatus,* far to the east. The fact that only the first of these feeds on a woody plant attests to the general influence of these new environments on a plains ecology. However, it is the interplay of many factors such as decreasing density of the entire fauna, new sympatries on both the biome and community level, and the extreme changes in general ecology that effect the total numbers of species losses or gains. The loss of species, however, seems to outweigh species

gains whenever undisturbed areas are cultivated or otherwise "upset."

Two recent studies concerning western Great Plains areas (Johnson, 1971, and F. Martin Brown, in preparation) comment on some effects of these new interactions. They indicate that there is consistent balance of indicative types of biota when general ecological situations begin to "mix." Nebraska as an arbitrary geographic area illustrates the interplay of many of these factors in an interesting way. The general trend is to decreasing densities and to a faunal admixture influenced by continual disturbances of micro-environments. Thus, the loss both in faunal number and the environments supportive of western montane species seems inevitable, along with the disappearance of plains-prairie forms utilizing more restrictive niches, and a possible decrease in frequency of "exotic" transients.

Considering the entire butterfly fauna, nearly every species one would expect to occur in the state has been recorded. Some long-sought species, like *Phyciodes campestris* and *Phyciodes mylitta,* have been found, but only once or twice and only in recent years. Collectors should look not so much for new species records, as for rediscoveries of previously recorded taxa not recently observed. Further, more exact data on density is needed to make accurate observations as to temporal changes. Additions to the state list of species may be made eventually in the Hesperiidae (Skippers). *Amblyscirtes nysa* was a new state record in 1969. Some of the Nebraska lepidopterists do not collect skippers, perhaps because their taxonomy is less well known or simply because they are less attractive.

Some Nebraska butterflies are only reported in the southeast and northwest. This can be explained primarily by the extent of collecting in these regions of the state. The east has been quite thoroughly collected by Mr. Spencer, Mr. Froemel, Mr. Kohler, and me. Likewise, much of my collecting has been in the northwest. Only a few weeks were spent collecting in many central areas.

There are a number of species whose distributions deserve further comment. Some extend into areas which were previously unknown for them, at least from published records. These range extensions include: westward extension for *Phyciodes batesii, Poanes hobomok,* and *Euptychia cymela;* eastward extension for montane species such as *Speyeria edwardsii, Mitoura siva, Nymphalis milberti, Papilio zelicaon,* and *Lycaena rubidus;* northward extension for *Asterocampa celtis antonia, Phyciodes phaon,* and

Atalopedes campestris. There is only one instance of southward extension, that of the single record of *Papilio nitra.*

The occurrence of some rare species in the eastern part of the state is explainable as accidental or chance transients: *Chlosyne lacinia, Heliconius charitonius, Leptotes marinus, Phyciodes vesta, Phyciodes picta,* and *Mestra amymone.* These species commonly journey into northern states, perhaps following the route of the Missouri River, or in response to the strong winds that blow northward across the plains in late summer. Their records usually indicate the resident location of lepidopterists rather than indicating the biological or ecological preferences of the butterflies. Similar instances of transients occurred at the time of early collections when butterflies like *Papilio palamedes, Appias drusilla,* and *Kricogonia lyside* were recorded.

In many taxonomic groups of Nebraska butterflies, a distinctive separation can be made between "mountain-dwelling forms" in the west, and "plains-prairie forms" in the east. For example, *Papilio glaucus* occurs in the eastern part of the state and *Papilio multicaudatus* in the west. Likewise, *Limenitis astyanax* occurs in the east and *Limenitis weidemeyerii* in the west. The distribution of species representing the genus *Speyeria* (the fritillaries) is also distinctive. Apparently these groupings are physicially separated by the Sandhills barrier, as can be noted from the accompanying distribution maps. The Sandhills is an area of mixed-prairie often lacking any significant occurrence of trees or shrubs.

There are only two instances of reported Nebraska species which are evidently in error. These are *Pieris napi* and *Papilio bairdii.* I have not seen the specimens on which the records are based. However, the former species is a high elevation Rocky Mountain species, while the latter is a form rarely found east of the continental divide. There is another species reported as occurring in Nebraska that I have not been able to verify. This is *Mitoura gryneus* as reported in Klots (1951). This species is not represented in any local collection, nor has it appeared through the searching of appropriate biomes in eastern Nebraska. I have commented on factors involving apparent hybridization in the food plant of this genus (Johnson, 1972) and the eastward extension of *M. siva.* No doubt any *Mitoura gryneus* populations occurring in the state are involved with this same phenomenon. Concerning the early reports of many western montane taxa purported to occur on the plains, one must always use caution. Christenson, in his study of Iowa butterflies (1971), reports a

number of these early citations which are extremely problematic in verifying. Reservation is always wise concerning these records. The rest of the Nebraska records have been deemed valid either by my personal examining, that of a specialist, or the high probability of their occurrence and ease of determination by non-specialists.

A few of the species recorded in Nebraska are known from only one specimen. These are clearly transients, and include *Heliconius charitonius, Appias drusilla,* and possibly *Amblyscirtes nysa.* Others, like *Plebejus saepiolus,* are extreme western-montane taxa. A high incidence of single records occurs in the Hesperiidae (Skippers). No doubt this is because they have been pursued the least by collectors. Considering butterflies in general, some of the "rare" species in Nebraska are extremely local and occur only locally throughout their North American ranges. Examples are *Limenitis archippus, Anaea andria, Pieris sisymbrii, Atrytone arogos,* and *Euphyes bimacula.*

Nebraska as an Ecotone Between "Eastern" and "Western" Biota:

Much has been written about the uniqueness of Nebraska as an ecotone between "eastern" and "western" biota. Several writers have testified to the geographical sympatry of plants in Nebraska (Nixon, 1967; Tolstead, 1947; Wells, 1965). Likewise, the butterfly fauna has often been remarked as one of an interesting admixture of species (Cary, 1901; Leussler, 1938, 1939; Johnson and Nixon, 1967), and is a major thesis of this work.

In considering the east-west ecotonal influence in Nebraska, it is best to begin with reference to the flora. The vegetation of the state exhibits a broad transition from the deciduous forest in the Missouri Valley, through tall grass and mixed prairie, to coniferous forest in the west. The most distinct change is in the west where the wooded escarpments rise abruptly above the plains, and altitudes range up to 5000 feet. Such areas occur in the northwest and southwest "panhandle." The effect of this biome on the Nebraska flora is interesting. These areas have become harbors for plants which characterize coniferous biomes in western and northern North America. Nixon (1967) points out that within the western pine forests can be found various botanical oddities. For instance, here may be found woody species characteristic of the north, such as *Populus tremuloides* Nichx., *Amelancier alnifolia* Nutt., *Cornus stolenifera* Michx., and *Shepherdia canadensis* (L.) Nels., as well as *Koleria cristata* (L.) Pers., *Stipa comata* Trin. and Rupr., *Stipa viridula* Trin., *Agropyron smithii* Rydb., and *Elymus canadensis* L. *Pinus*

ponderosa Laws. is the dominant plant and is characteristic of the Rocky Mountains. Another Rocky Mountain species is also present: Mountain mahogany (*Cerocarpus montanus* Raf.). Species of *Artemisia* and *Mammillaria,* and the ever-present *Yucca glauca* Nutt. represent the Great Basin influence (Nixon, 1967). Others could be mentioned, from north, south, east, and west. These coniferous forest biomes extend eastward along the northern water courses, well past the midline of the state, and juniper-covered bluffs occur in many parts of the western counties. These all tend to support a number of butterfly species which are not characteristic of the surrounding plains.

Likewise, ornithologists in Nebraska are familiar with the variety of western birds occupying niches in the western part of the state. Birds like the Mountain Bluebird (*Sialia currucoides*), Pinon Jay (*Cyanocephalus cyanocephalus*), Western Tanager (*Paranga ludoviciana*), Bullock's Oriole (*Icturus bullocki*), and Townsend's Solitaire (*Myadestes townsendi*) occur with varying frequency in the escarpments.

Lepidopterists (Cary, 1901; Johnson and Nixon, 1967) noticed the graduation from typically eastern to western species as one moves westward in the state. When the coniferous escarpments are reached, one begins to find butterflies such as *Colias alexandra, Pieris sisymbrii, Limenitis weidemeyerii, Hesperia pahaska, Oeneis uhleri, Euphydryas anicia, Papilio multicaudatus,* and many others typical of the western regions of North America. Also, range extensions of western species such as *Limenitis weidemeyerii, Mitoura siva,* and *Papilio multicaudatus* occur in some cases east of the one-hundredth meridian. The Rocky Mountain taxa *Neominois ridingsii* and *Papilio indra* once extended into the high altitude grasslands of the southern "panhandle," and *Mitoura siva* has become established on the juniper-covered bluffs of the southwestern counties.

To illustrate the biogeographical sympatry of butterflies in the Pine Ridge, simple faunal resemblance statistics can be utilized. Using a formula attributed to P. Jaccard (Long, 1963) where C is total taxa in common, and N_1 and N_2 are the number of taxa in each sample, a simple percentage of faunal resemblance can be calculated.

$$\text{percent resemblance} = \frac{C\ (100)}{N_1 + N_2 - C}$$

Using this formula, the faunal resemblance between the Pine

Ridge and the Black Hills of South Dakota is 60%. Likewise, the percent resemblance between the Pine Ridge and the Nebraska plains is 55%. But the affinity between the Black Hills fauna and that of the Nebraska plains is only 28%, indicating that the Pine Ridge is an area of distributional overlap for a large number of species of butterflies. The sample list for the Black Hills was taken from the literature and personal correspondence. In the Pine Ridge a large number of both "eastern" and "western" types of butterflies occur, and it is the area in which many species reach the western or eastern limit of their respective ranges. The situation is similar in the Wildcat Range, with montane species occurring eastward until no semblance of coniferous forest is left and the buttes give way to the plains.

Nearly thirty species of butterflies occur in the Pine Ridge (and similarly in the Wildcat Range) which are not listed in Klots' (1951) *Field Guide.* Lepidopterists generally consider this book as treating the North American butterfly fauna east of the one-hundredth meridian. This geographic line is nearly a perfect mid-line for Nebraska. Hence, Nebraska's large fauna is largely attributable to the montane influence in the west, coupled with the presence of many eastern butterflies in the eastern counties which are characteristic of Kansas, Missouri, Iowa, and eastern South Dakota. The phenomenon of interesting biogeographical overlapping of species is well illustrated in certain areas of Nebraska in many groups of organisms. Similar conditions are found in many of the Great Plains states and deserve more thorough study.

Outgrowths of the Present Study:

Several possible outgrowths of this project have been mentioned in the annotated list. The taxonomic problems involving *Everes comyntas* and *Everes amyntula* have been investigated (Downey and Christenson, 1970), but problems remain with western Great Plains representatives of *Pieris sisymbrii, Lethe eurydice, Boloria selene, Asterocampa celtis,* and *Cercyonis* ssp.

More research is needed on food plant relationships in the state, particularly those of the western *Speyeria.* The effect of lower altitudes on voltinism of montane species needs to be investigated. In this case, the occurrence of longer broods in the fritillaries (*Speyeria* ssp.) invites interest.

More complete studies of the distributions of *Lycaena xanthoides, Polygonia satyrus, Polygonia comma, Papilio multicaudatus, Lycaena rubidus, Lethe eurydice, Mitoura siva,* and others could provide important biological data as to evolutionary and

ecological relationships. The role of the Sandhills region as an ecological barrier needs to be investigated. Density of species occurrence should also be an important aspect of study since it will permit conclusions on changes in population with time. Nebraska also affords many areas in which the phenomena of new sympatries and distributional overlapping can be observed and investigated.

Also, the present study would indicate the need for further taxonomic and distributional studies of the entire faunas of areas like the Black Hills of South Dakota, and the states of North Dakota and Montana.

Research on all of these topics is important to the general knowledge of the biology of the middle United States. Surely the study of specific groups such as the butterflies will provide a basis on which can be built our general ecological knowledge of the region.

CHECKLIST OF THE BUTTERFLIES OF NEBRASKA

SATYRIDAE

Satyrinae

1. *Oeneis uhleri uhleri* (Reakirt)
2. *Cercyonis oetus oetus* (Boisduval)
3. *Cercyonis meadii* (Edwards)
4. *Cercyonis pegala* (Fabricius)
5. *Neominois ridingsii ridingsii* (Edwards)
6 *Coenonympha ochracea ochracea* Edwards
7. *Euptychia cymela* (Cramer)

Lethinae

8. *Lethe eurydice* (Johannson)
9. *Lethe portlandia* (Fabricius)

DANAIDAE

Danainae

10. *Danaus* (*Tasitia*) *gilippus* (Cramer)
11. *Danaus* (*D.*) *plexippus plexippus* (Linnaeus)

NYMPHALIDAE

Heliconiinae

12. *Agraulis vanillae* (Linnaeus)
13. *Dryas julia* (Fabricius)
14. *Heliconius charitonius* (Linnaeus)

Argynninae
15. *Euptoieta claudia* (Cramer)
16. *Speyeria* (*S.*) *aphrodite* (Fabricius)
17. *Speyeria* (*S.*) *cybele cybele* (Fabricius)
18. *Speyeria* (*S.*) *atlantis* (Edwards)
19. *Speyeria* (*S.*) *callippe meadii* (Edwards)
20. *Speyeria* (*S.*) *zerene* (Boisduval)
21. *Speyeria* (*S.*) *coronis* (Behr)
22. *Speyeria* (*S.*) *edwardsii* (Reakirt)
23. *Speyeria* (*S.*) *idalia* (Drury)
24. *Boloria* (*Clossiana*) *selene* (Denis and Schiffermuller)

Melitaeinae
25. *Euphydryas anicia bernadetta* Leussler
26. *Melitaea* (*Microtia*) *pola* Boisduval
27. *Melitaea* (*M.*) *ismeria carlota* (Reakirt)
28. *Melitaea* (*M.*) *nycteis drusius* (Edwards)
29. *Phyciodes* (*Phyciodes*) *vesta* (Edwards)
30. *Phyciodes* (*P.*) *picta* Edwards
31. *Phyciodes* (*P.*) *campestris camillus* Edwards
32. *Phyciodes* (*P.*) *mylitta* (Edwards)
33. *Phyciodes* (*P.*) *phaon* (Edwards)
34. *Phyciodes* (*P.*) *batesii* (Reakirt)
35. *Phyciodes* (*P.*) *tharos tharos* (Drury)
36. *Phyciodes* (*Tritanassa*) *texanna* (Edwards)
37. *Chlosyne lacinia adjutrix* Scudder

Nymphalinae
38. *Polygonia progne* (Cramer)
39. *Polygonia zephyrus* (Edwards)
40. *Polygonia hylas* (Edwards)
41. *Polygonia satyrus* (Edwards)
42. *Polygonia comma* (Harris)
43. *Polygonia interrigationis* (Fabricius)
44. *Nymphalis antiopa* (Linnaeus)
45. *Nymphalis milberti* (Godart)
46. *Nymphalis vau-album j-album* (Boisduval and LeConte)

Vanessinae
47. *Junonia coenia coenia* (Huebner)
48. *Vanessa caryae* Huebner
49. *Vanessa cardui* (Linnaeus)
50. *Vanessa virginiensis* (Drury)
51. *Vanessa atalanta* (Linnaeus)

Limenitidinae
52. *Limenitis weidemeyerii* (Edwards)
53. *Limenitis archippus* (Cramer)
54. *Limenitis arthemis astyanax* (Fabricius)

Eurytelinae
55. *Mestra amymone* (Menetries)

Apaturinae
56. *Asterocampa clyton* (Boisduval and LeConte)
57. *Asterocampa celtis* (Boisduval and LeConte)
Charaxinae
58. *Anaea andria* Scudder

LIBYTHEIDAE
Libytheinae
59. *Libytheana bachmanni* (Kirtland)

LYCAENIDAE
Plebejinae
60. *Celastrina argiolus* (Linnaeus)
61. *Glaucopsyche lygdamus oro* Scudder
62. *Scolitantides piasus* (Boisduval)
63. *Everes comyntas* (Godart)
64. *Plebejus (Icaricia) acmon* (Westwood)
65. *Plebejus (I.) shasta minnehaha* (Scudder)
66. *Plebejus (I.) icarioides lycea* (Edwards)
67. *Plebejus (Plebejus) saepiolus* (Boisduval)
68. *Lycaeides melissa* (Edwards)
69. *Hemiargus isola* (Reakirt)
70. *Leptotes marina* (Reakirt)
71. *Brephidium exilis exilis* (Boisduval)
Lycaeninae
72. *Lycaena phlaeas americana* Harris
73. *Lycaena dorcas dorcas* Kirby
74. *Lycaena rubidus* Behr
75. *Lycaena xanthoides dione* Scudder
76. *Lycaena thoe* Guerin
Gerydinae
77. *Feniseca tarquinius* (Fabricius)
Theclinae
78. *Strymon liparops aliparops* Michener and dos Passos
79. *Strymon falacer* (Godart)
80. *Strymon edwardsii* (Grote and Robinson)
81. *Strymon acadica montanensis* Watson and Comstock
82. *Strymon titus titus* (Fabricius)
83. *Strymon melinus* (Huebner)
84. *Strymon cecrops* (Fabricius)
85. *Incisalia niphon* (Huebner)
86. *Incisalia eryphon* (Boisduval)
87. *Incisalia henrici* (Grote and Robinson)
88. *Mitoura siva* (Edwards)

PIERIDAE
Euchloeinae
89. *Euchloe olympia rosa* (Edwards)
90. *Euchloe ausonides coloradensis* (Edwards)

91. *Anthocaris genutia* (Fabricius)

Coliadinae

92. *Nathalis iole* Boisduval
93. *Eurema nicippe nicippe* (Cramer)
94. *Eurema lisa lisa* Boisduval and LeConte
95. *Eurema mexicana* (Boisduval)
96. *Kricogonia lyside* (Godart)
97. *Phoebis sennae eubule* (Linnaeus)
98. *Phoebis agarithe* (Boisduval)
99. *Anteos maerula* (Fabricius)
100. *Colias* (*Zerene*) *caesonia caesonia* (Stoll)
101. *Colias alexandra* Edwards
102. *Colias philodice* Godart
103. *Colias eurytheme* Boisduval

Pierinae

104. *Pieris rapae* (Linnaeus)
105. *Pieris protodice* Boisduval and LeConte
106. *Pieris sisymbrii* Boisduval
107. *Appias drusilla* (Cramer)
108. *Neophasia menapia* (Felder and Felder)

PAPILIONIDAE

Papilioninae

109. *Graphium marcellus* (Cramer)
110. *Papilio palamedes* Drury
111. *Papilio troilus troilus* Linnaeus
112. *Papilio multicaudatus* Kirby
113. *Papilio rutulus* Boisduval
114. *Papilio glaucus* Linnaeus
115. *Papilio cresphontes* Cramer
116. *Papilio indra* Reakirt
117. *Papilio zelicaon* Lucas
118. *Papilio nitra* Edwards
119. *Papilio polyxenes asterius* Stoll
120. *Battus philenor* (Linnaeus)

Parnassinae

121. *Parnassius phoebis sayii* Edwards

HESPERIIDAE

Pyriginae

122. *Epargyreus clarus* (Cramer)
123. *Thorybes pylades* (Scudder)
124. *Thorybes bathyllus* (Abbot and Smith)
125. *Staphylus mazana hayhurstii* (Edwards)
126. *Erynnis juvenalis* (Fabricius)
127. *Erynnis horatius* (Scudder and Burgess)
128. *Erynnis martialis* (Scudder and Burgess)
129. *Erynnis zarruco funeralis* (Scudder and Burgess)

130. *Erynnis lucilius afranius* (Scudder and Burgess)
131. *Erynnis persius* (Scudder and Burgess)
132. *Erynnis brizo* (Boisduval and LeConte)
133. *Pyrgus communis* (Grote)
134. *Pholisora catullus* (Fabricius)

Hesperiinae

135. *Ancyloxipha numitor* (Fabricius)
136. *Oarisma garita* (Reakirt)
137. *Oarisma powesheik* (Parker)
138. *Hylephila phyleus* (Drury)
139. *Yvretta rhesus* (Edwards)
140. *Hesperia attalus* (Edwards)
141. *Hesperia ottoe* Edwards
142. *Hesperia pawnee* Dodge
143. *Hesperia pahaska pahaska* Leussler
144. *Hesperia comma colorado* (Scudder)
145. *Hesperia uncus* (Edwards)
146. *Polites mystic dacotah* (Edwards)
147. *Polites manataaqua* (Scudder)
148. *Polites themistocles* (Latreille)
149. *Polites peckius* (Kirby)
150. *Wallengrenia otho egeremet* (Scudder)
151. *Pompeius verna* (Edwards)
152. *Atalopedes campestris* (Boisduval)
153. *Atrytone delaware delaware* (Edwards)
154. *Atrytone arogos* (Boisduval and LeConte)
155. *Poanes taxiles taxiles* (Edwards)
156. *Poanes zabulon* (Boisduval and LeConte)
157. *Poanes hobomok* (Harris)
158. *Euphyes vestris vestris* (Boisduval)
159. *Euphyes bimacula* (Grote and Robinson)
160. *Euphyes conspicua* (Edwards)
161. *Euphyes dion* (Edwards)
162. *Atrytonopsis hiana* (Scudder)
163. *Amblyscirtes vialis* (Edwards)
164. *Amblyscirtes nysa* Edwards
165. *Amblyscirtes oslari* (Skinner)
166. *Lerodea eufala* (Edwards)

MEGATHYMIDAE

167. *Megathymus streckeri texanus* Barnes and McDunnough

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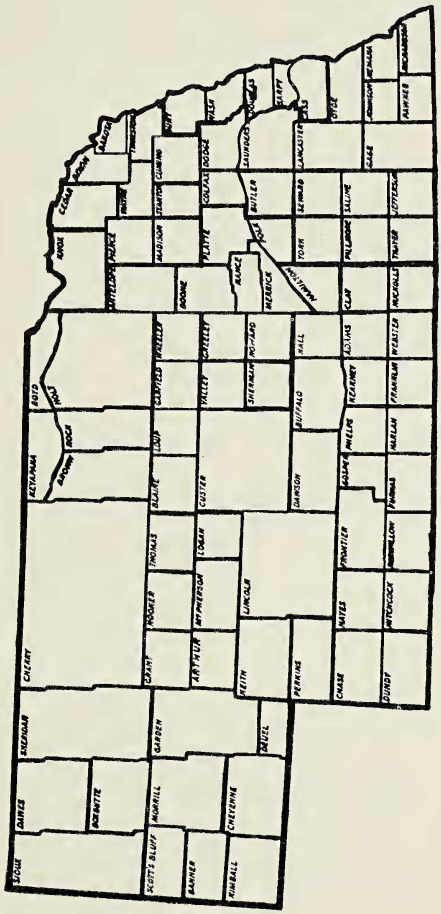

Fig. 1.—Map of Nebraska with counties indicated.

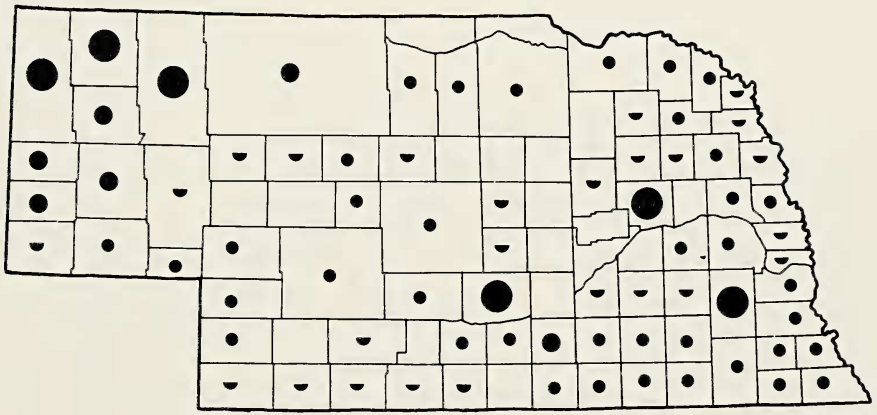

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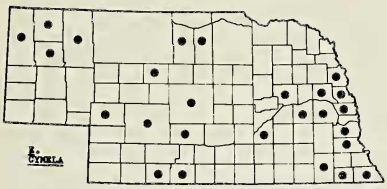
Fig. 2.—Relative amounts of recent butterfly collecting in Nebraska counties. Large dot: Extensive collecting since 1960 by Nebraska lepidopterists. Medium dot: Frequent collecting since 1960 by Nebraska lepidopterists. Small dot: Collected by Johnson and Running in 1969. Half circle: Recent butterfly records exist from these counties but no concerted effort has been made to collect in them.



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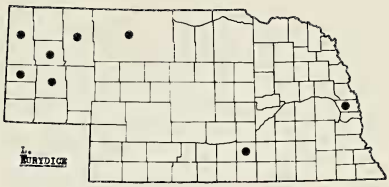

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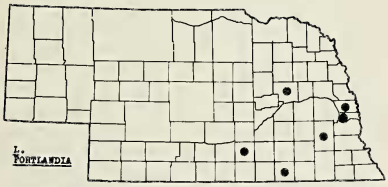

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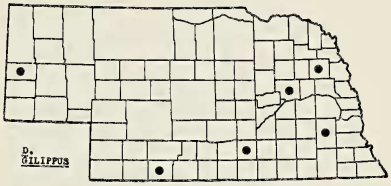

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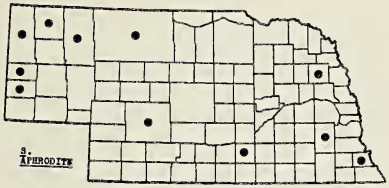

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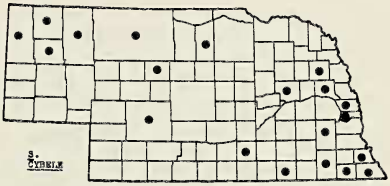

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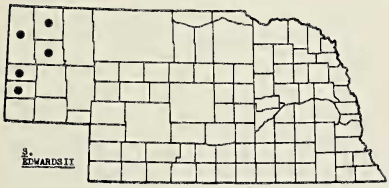

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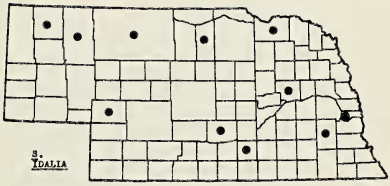
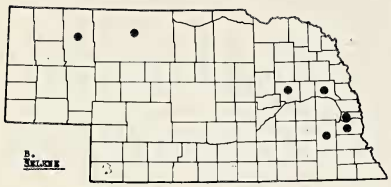


10

Distribution of Selected Butterflies in Nebraska
Fig. 3.—*Euptychia cymela* (Cramer)
Fig. 4.—*Lethe eurydice* (Johannson)
Fig. 5.—*Lethe portlandia* (Fabricius)
Fig. 6.—*Danaus gilippus* (Cramer)
Fig. 7.—*Speyeria aphrodite* (Fabricius)
Fig. 8.—*Speyeria cybele* (Fabricius)
Fig. 9.—*Speyeria edwardsii* (Reakirt)
Fig. 10.—*Speyeria idalia* (Drury)



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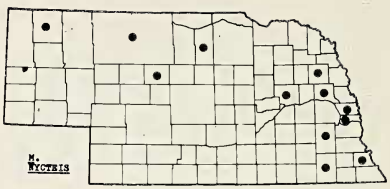

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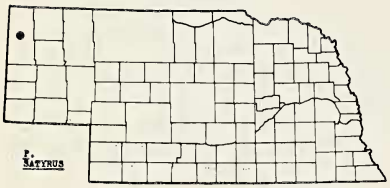

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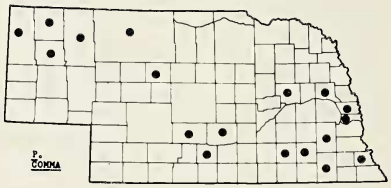

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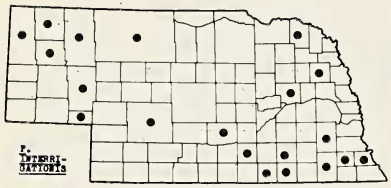

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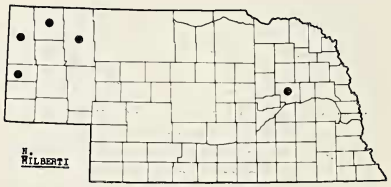

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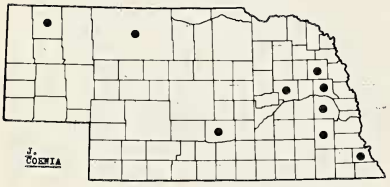

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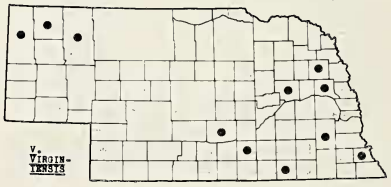

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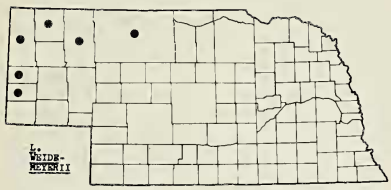
Distribution of Selected Butterflies in Nebraska

Fig. 11.—*Boloria selene* (Denis and Schiffermuller)
Fig. 12.—*Melitaea nycteis* (Doubleday)
Fig. 13.—*Polygonia satyrus* (Edwards)
Fig. 14.—*Polygonia comma* (Harris)
Fig. 15.—*Polygonia interrigationis* (Fabricius)
Fig. 16.—*Nymphalis milberti* (Godart)
Fig. 17.—*Junonia coenia* (Huebner)
Fig. 18.—*Vanessa virginiensis* (Drury)



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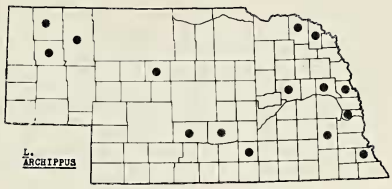

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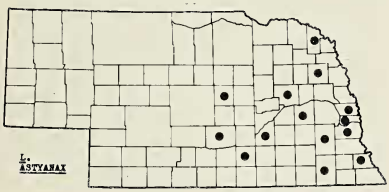

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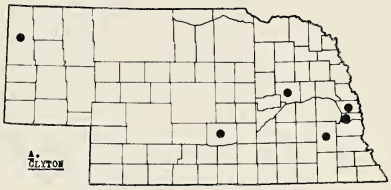

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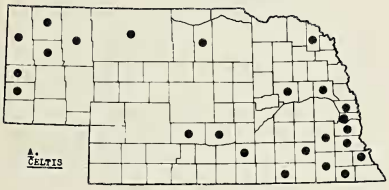

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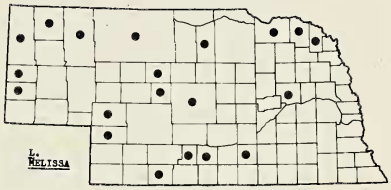

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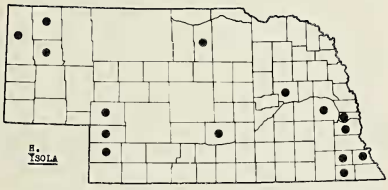

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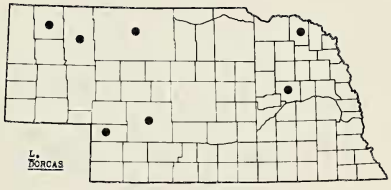

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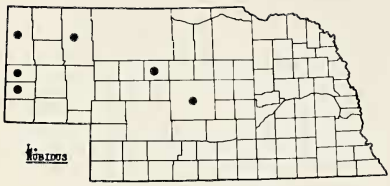
Distribution of Selected Butterflies in Nebraska
Fig. 19.—*Limenitis weidemeyerii* (Edwards)
Fig. 20.—*Limenitis archippus* (Cramer)
Fig. 21.—*Limenitis astyanax* (Fabricius)
Fig. 22.—*Asterocampa clyton* (Boisduval and Le Conte)
Fig. 23.—*Asterocampa celtis* (Boisduval and LeConte)
Fig. 24.—*Lycaeides melissa* (Edwards)
Fig. 25.—*Hemiargus isola* (Reakirt)
Fig. 26.—*Lycaena dorcas* Kirby



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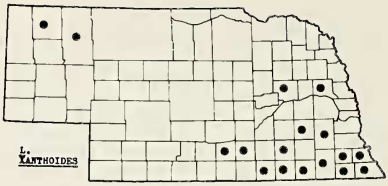

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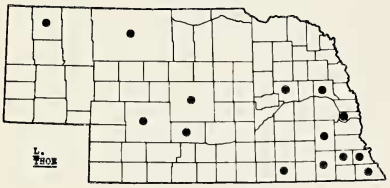

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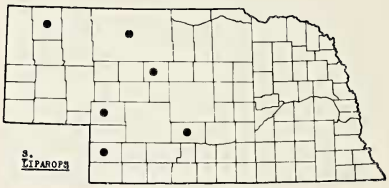

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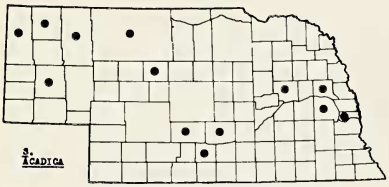

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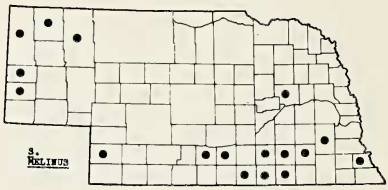

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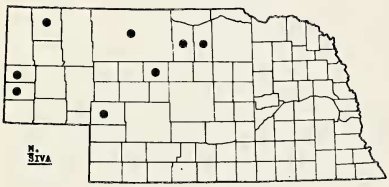

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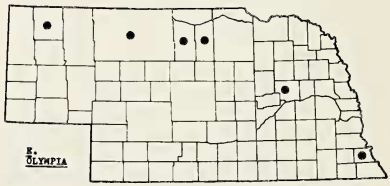

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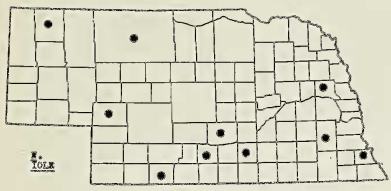
Distribution of Selected Butterflies in Nebraska
Fig. 27.—*Lycaena rubidus* Behr
Fig. 28—*Lycaena xanthoides* Boisduval
Fig. 29.—*Lycaena thoe* Guerin
Fig. 30.—*Strymon liparops* (LeConte)
Fig. 31.—*Strymon acadica* (Edwards)
Fig. 32.—*Strymon melinus* (Huebner)
Fig. 33.—*Mitoura siva* (Edwards)
Fig. 34.—*Euchloe olympia* (Edwards)



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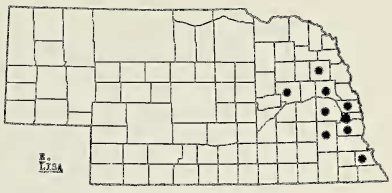

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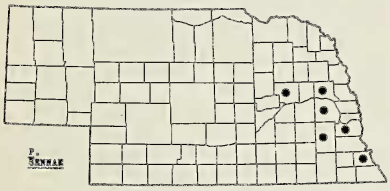

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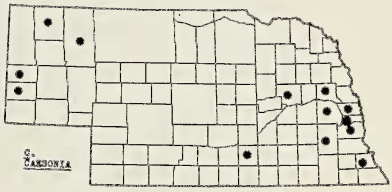

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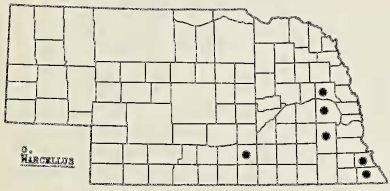

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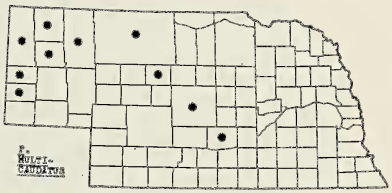

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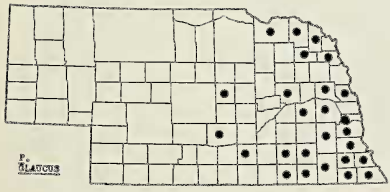

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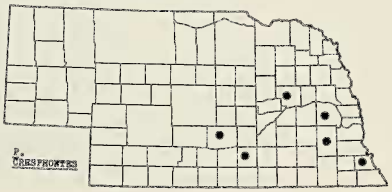

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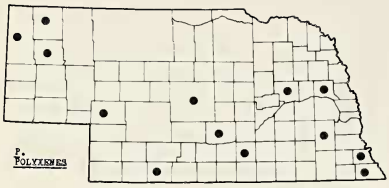
Distribution of Selected Butterflies in Nebraska
Fig. 35.—*Nathalis iole* Boisduval
Fig. 36.—*Eurema lisa* Boisduval and LeConte
Fig. 37.—*Phoebis sennae* (Linnaeus)
Fig. 38.—*Colias caesonia* (Stoll)
Fig. 39.—*Graphium marcellus* (Cramer)
Fig. 40.—*Papilio multicaudatus* Kirby
Fig. 41.—*Papilio glaucus* Linnaeus
Fig. 42.—*Papilio cresphontes* Cramer



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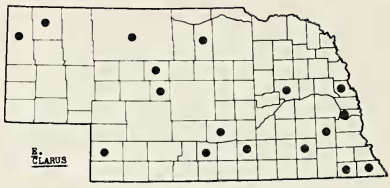

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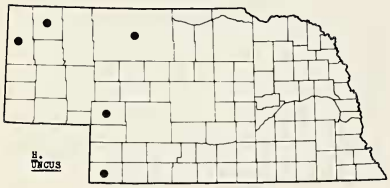

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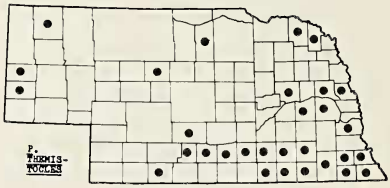

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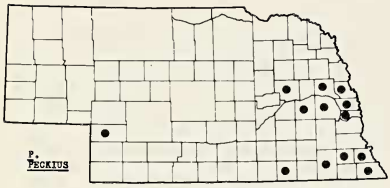

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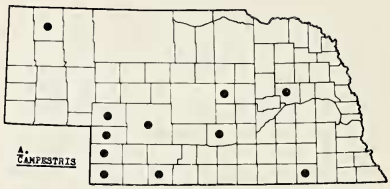

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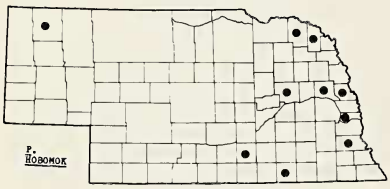

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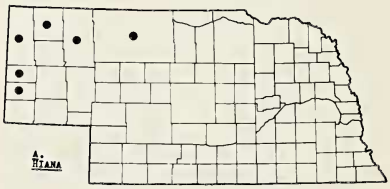

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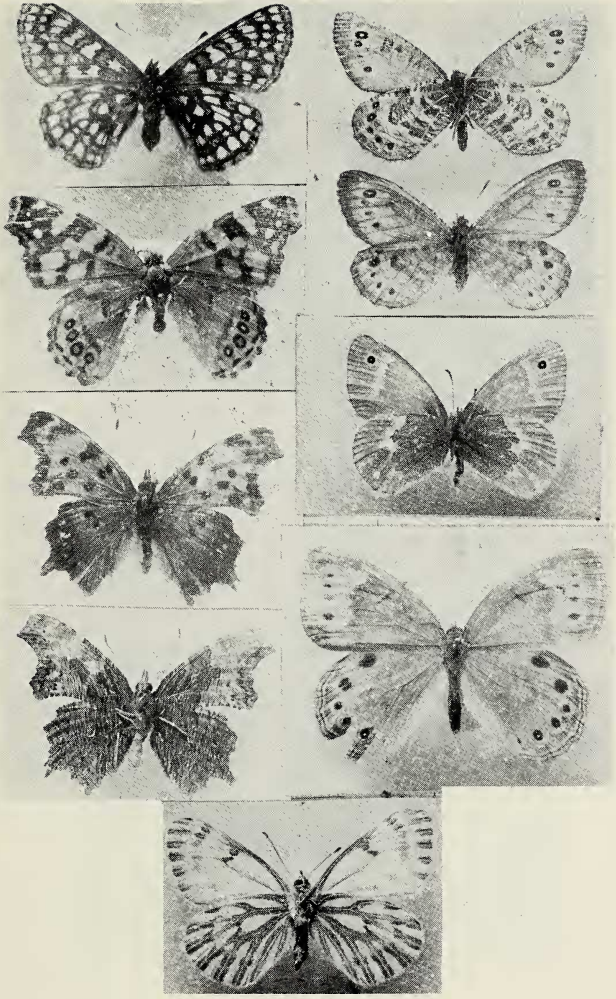
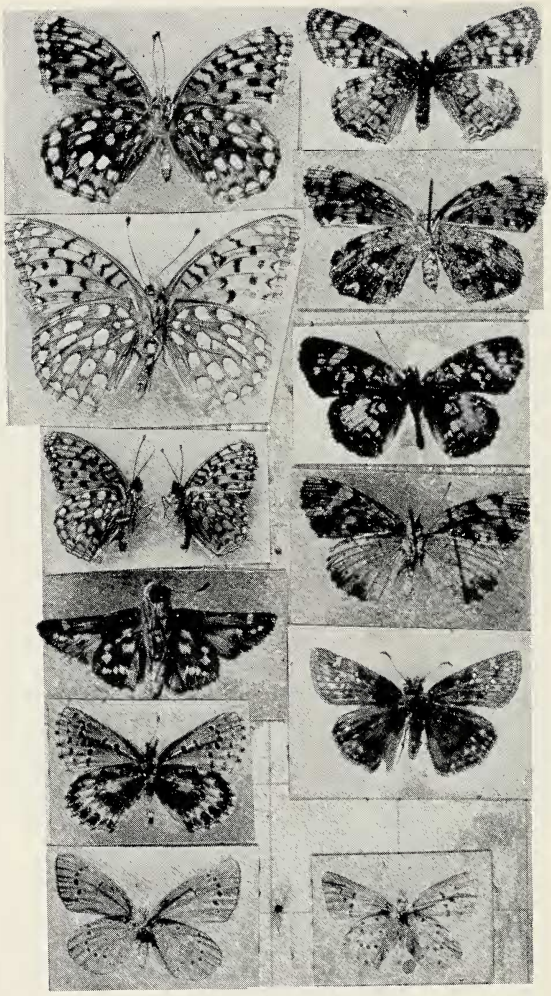
Distribution of Selected Butterflies in Nebraska
Fig. 43.—*Papilio polyxenes* Fabricius
Fig. 44.—*Epargyreus clarus* (Cramer)
Fig. 45.—*Hesperia uncus* (Edwards)
Fig. 46.—*Polites themistocles* (Latreille)
Fig. 47.—*Polites peckius* (Kirby)
Fig. 48.—*Atalopedes campestris* (Boisduval)
Fig. 49.—*Poanes hobomok* (Harris)
Fig. 50.—*Atrytonopsis hiana* (Scudder)



LEGEND

Euphydryas anicia bernadetta, 45mm.
Vanessa caryae, 48mm.
Polygonia hylas, upper, 44mm.
same, lower, 44mm.
Oeneis uhleri uhleri, lower 45mm.
same, upper, 45mm.
Coenonympha ochracea ochracea, upper, 30 mm.
Lethe eurydice, upper 45mm.

Pieris sisymbrii, under, 37mm.



LEGEND

Speyeria aphrodite ethne, under, 63mm.
Speyeria callippe meadii, under, 61mm.
left, *Speyeria coronis,* under, 29mm. (½)
right, *Speyeria zerene,* under, 25mm. (½)
Hesperia pahaska, under, 34mm.
Scolitantides piasus, under, 29mm.
Glaucopsyche lygdamas ssp., under, 29mm.

Phyciodes mylitta, upper, 35 mm.
same, lower.

Phyciodes batesii, upper, 32mm.
same, lower.

Erynnis lucilius afranius, 35 mm.
Plebejus saepiolus, under, 30 mm.